



SUPPORTING EDUCATION

MESSAGE FROM THE PREMIER OF SOUTH AUSTRALIA
THE HON J C BANNON MP

As we head towards the next century, our schools, our teachers and our students are facing remarkable challenges.

Right across Australia we are setting new standards in education based on excellence and relevance to career demand.

In South Australia we are establishing a network of specialist schools which highlight excellence in the teaching of English, Maths and the Sciences.

This is part of the changing perception of education – the recognition right across the board that the system must deliver training and skills programs to meet the demands of the nineties and beyond.



21•C makes a great contribution to our whole education system. I am delighted that it is now available through South Australian Secondary Schools.

It carries the messages and the concerns of a generation which will play a vital role in Australia's development.

J C Bannon

It Computes! Apple computer Australia Pty Ltd: Supporting Education and our future.

BUILDING THE FUTURE

MESSAGE FROM AUSTRALIA'S COMMISSION FOR THE FUTURE

We know – as many teachers know – just how good 21•C is, and how valuable it is for classwork.

Now the Australian Commission for the Future, with the support of Apple Computer Australia and the Premier of South Australia, John Bannon, is able to place a free copy of this issue of $21 \cdot C$ in every government school in South Australia.

I hope you join our growing number of supporters.

Robyn Williams



Apple. The power to be your best.

PUSHING THE FUTURES LINE

OW MANY AUSTRALIANS WILL REMEMBER THAT THE Australian Commission for the Future alongside the CSIRO were elected to the United Nations Environment Program's Global 500 Honour role in 1989? This recognised an ambitious and successful public awareness program on climate change staged in 10 cities linked by teleconferencing, involving 80 organisations around Australia. The citation reads, "no other organisation or nation has so far conducted any comparable awareness program on climate change".

The world honour sits alongside two Australian Book Publishers Association awards to the Commission in 1989 for The Personal Action Guide for the Earth.

The Australian Commission for the Future is one of the few futures or foresight institutions in the world. Writing in the April edition of the international journal Futures, Dr Rich-ard Slaughter describes Commission's role over the past six years as pioneering. Dr Slaughter writes:

"Futures-oriented organisations need to Susan Oliver participate in, and support, research into the Managing Director, The Australian Commission for the Future. nature and effectiveness of futures research and applied foresight. This type of research is not yet common, yet it is of fundamental importance if optimum use is to be made of pioneering institutions of foresight.

The Commission for the Future is just such a pioneering institution. It is therefore not surprising that it has had a long, and often difficult, period of development. However, much has been learned over the six years of its existence. Time will tell if it will, in fact, evolve into a world-class institution of foresight. Present indications are that it could well do so: the potential is there in terms of leadership, structure and opportunity. There is no reason why it should not go on to be an internationally significant player in the futures field.

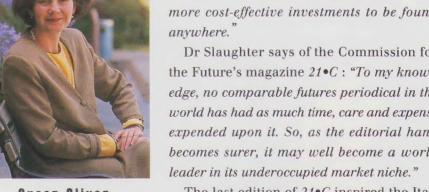
After six trying years, Australia finally has a futures organisation that it can begin to use and be proud of. The present federal opposition is quite wrong to persist in threatening the withdrawal of residual core funding if they win the next election. This blatant example of ideological thinking does them no credit whatsoever. If the long-term well-being of the nation is a major concern then one could suggest many more appropriate candidates for extinction: economic rationalism; cynicism; short-termism; and the fatalistic 'she'll be alright' attitudes of the past. Politicians on both sides of the house need to understand that viable futures for Australia cannot be fashioned from such self-defeating imperatives. A more promising view is that worthwhile futures can be fashioned by people of vision, intelligence and goodwill; people who will make strong, consistent decisions about the kind of futures they want and stand by them for long enough to make them happen. It is not a short-term commitment, but a long-term one.

The shift from short-term to long-term is primary. In that respect some South-East Asian countries (notably Japan) are already well ahead. So the Australian government (of whatever persuasion) and people need to lift their sights toward a more long-range and strategic stance. They need to understand the pivotal role of institutions of foresight and support them in

> every way they can. They should appreciate that foresight is not merely prudent, if brings a range of significant savings. There are few more cost-effective investments to be found anywhere."

> Dr Slaughter says of the Commission for the Future's magazine 21 • C: "To my knowledge, no comparable futures periodical in the world has had as much time, care and expense expended upon it. So, as the editorial hand becomes surer, it may well become a world

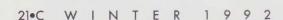
> The last edition of 21°C inspired the Italian futures expert James Ruscoe to coment: "Excellent edition of 21 • C, very colourful,



very vibrant - lots and lots of ideas. The sort of mine of information lots of kids must adore having around the house especially if they are in the Outback (physical or cultural). And there are many different ways of growing up in isolation, as I'm sure you appreciate." Neville Hurst of the Department of Industry, Technology and Commerce said of the issue: "It is an improvement on an already good journal... the change in design... improved readability while still being graphically attractive... would serve as a useful basis for a seminar on how to get things right!" And the chairman of the CSIRO, Adrienne Clarke, said, "a particularly inviting presentation. To me it appears attractive and appealing to the reader.... Best wishes for the continuing efforts."

Numerous other comments - compliments and criticisms - have flowed into the Commission about the magazine. One thing is for certain, $21 \cdot C$ is in a class of its own in the world. It has established a new publishing standard for Australia. It is the public voice for the Commission for the Future airing the results of our research projects and raising those issues we believe are critical to the best possible future in Australia.

Over the past six months we have completed two major research reports, both of which have been featured in 21 • C. In December we reported our work into national savings and superannuation, attempting to shift the debate from merely addressing marginal adjustments at the edges of a



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flawed system, to looking towards a completely new model with major economic, social and equity results for Australia. This study was submitted to the Senate Committee on Superannuation and was the subject of briefings provided by the Commission to Federal and State Parliamentarians.

Aspects of our work in energy and the environment were reported in our March 1992 issue of $21 \cdot C$. While the deliberations in Rio de Janeiro in June on the greenhouse/climate change issues within the broader environment and development considerations will probably be disappointing in terms of establishing a time-table for emission reductions worldwide, governments and companies with a view to the longer term will see the writing on the wall. The economic constituency for energy and environmental management will develop into one of the major forces for change. Companies and countries who do not maintain parity with international best practice in terms of energy efficiency, energy efficient technologies and cleaner burning technologies will become uncompetitive.

Energy management, and consequently, reductions in greenhouse gas causing emissions, requires a serious commitment from government and industry, the key partners for progress in this area over the next decade.

National savings, energy and the environment, future cities, future work and future forms of governance are themes central to our work in the next 12 months.

Underlying all of this endeavour are philosophies which are gaining popular support as we quickly approach the year 2000. The first is that we need to plan a future with desirable characteristics such as peace, economic well-being, equitable distribution of wealth and employment, environmental sustainability and so on. What is our future? Will it be the future we desire? What should we act on now to achieve the desired or preferred future?

How much better will we be at planning and implementing our preferred future if we are well informed? This is the second philosophy central to the Commission. We want important issues to be identified, understood and discussed. $21 \cdot C$ is a primary vehicle for this, our other publications and presentations further extend our range.

uturists perform an accepted professional and usually commercially rewarded role in many parts of the world. In such countries there is a tradition of futures planning, of long-term strategic planning. Can we imagine the process of developing a long-term strategic plan for Australia? It isn't a process we recognise. Yet the common sense of establishing and agreeing to such strategies, deploying resources – investment, people, policies, R&D effort – and establishing national priorities in pursuit of the plan, is well accepted by large companies.

In 1991, the Policy Studies Institute in London, funded by a consortium of government departments and private sector companies, published the report *Britain in 2010*. The report made some frank predictions:

"At present, skill levels in Britain lag behind our competitors – particularly in the low proportion staying on in education after 16. But, if the numbers in full-time education and training in Britain are doubled (as they probably need to be) the number of 16-24 year olds in the workforce will be reduced by more than a quarter.

"Work will not all be done by robots. The total number of jobs is likely to increase by 3-4 million, with a continuing fall in the number in agriculture and manufacturing, but increases in much of the service sector, particularly in business and professional services. The trend away from unskilled manual jobs to more highly skilled and professional occupations will continue and, in general, working conditions will tend to improve, with less sweat, dirt and danger and more skill, autonomy, responsibility and (for a minority) more opportunity for working from home.

The Australian government (of whatever persuasion) and people need to lift their sights toward a more long-range and strategic stance. DR RICHARD SLAUGHTER

"Rising quality standards, increasing use of new technologies and keener competition in the Single European Market will demand higher skill standards at all levels. Demographic changes will tend to reduce unemployment to below 1 million, but whether this actually happens will depend largely on whether people have the skills needed for the kinds of jobs that will be available."

Similar observations can probably be made for Australia if it is true that jobs will become increasingly complex, but more difficult to fill. Will Australia suffer the paradoxical situation of both having severe skills shortages and high unemployment?

France and Japan have a long tradition of futures studies, and in the case of these countries the reach of the future is a much more daring 50 to 100 years. Developing economies such as Malaysia are preparing futures targets to assist their societal and economic infrastructure.

Our vision of our future may worry us or simply elude us. There is no doubt in my mind that we should at a minimum analyse the available information to see the future repercussions of today's policy changes; a requirement our Federal Treasury recently faced when it was revealed that no calculations had been made on the longer term impacts on national savings of proposed superannuation policy changes. But establishing a future plan for Australia is more than that. It is a demanding but exciting prospect with the potential to focus and direct effort to move Australia towards a sustainable future, and the best possible future.

SUSAN OLIVER, Managing Director.

his 21 • C winter edition introduces a new Commission for the Future research paper on the future of work, with particular attention on youth. Gib Wettenhall explores the thinking behind a 1988 Commission report Casualties of Change – the impacts of change in modern society upon young people and previews the update of this work by its author Richard Eckersley.

Do we accept 10 per cent unemployment? On which groups does unemployment impact most? What will be the effect of unemployment in the longer term on this group and on society as a whole? These are questions which must be answered. There is a debate to be held.

Just as contentious are the issues raised by UK leadership specialist Alistair Mant, who questions the qualities needed for leaders to take us into the 21st century.

We interview the father of futures studies, Robert Jungk; a man moved by the events of history to try to get to a better vantage point overlooking our destiny. He became a futurist.

21•C celebrates our great scientists and investigates how we're wiring our cities.

And we acknowledge the UN Conference on Environment and Development with a special 'Rio round up' of policy positions and likely outcomes.

With this edition 21 • C introduces a letters to the editor column. As many of our readers have pointed out, the magazine sorely needs a forum for further debate. We also include in this edition our first readers' survey, designed to help us know whether we are fulfilling the hopes of our readers. We look forward to hearing from you, both with letters to the editor and the readers' survey.

Ashley Crawford, EDITOR

LETTERS

Dear Editor,

Ever since I came across $21 \cdot C$ I've been impressed with the quality of content and the range of issues it covers. As I was reading the last issue, I thought of something that you might consider adding to the magazine: a section of letters. It might encourage a bit of debate, but I thought that it goes along with your charter – "Part of its role is to encourage discussion and thinking about long-term trends and to communicate options for the future to decision makers and the public." $21 \cdot C$ would be a great forum for the ideas of the future.

Angus McLeay North Sydney, NSW

Dear Editor,

I wish to congratulate you on the stimulating, thought-provoking and futuristic discussions in your magazine. However I feel that your magazine does lack one very major segment, 'letters to the editor'.

How can you "... encourage... long-term trends..." if there is no forum for debate? Many of the articles contain statements which go unchallenged and most prophets have a dismal record over the short-term let alone the long...

ERIC LEWIS
Jericho, QLD

Dear Editor,

In response to the article interviewing Peter Singer regarding ethics of the future:

Some time ago I read about a gorilla called Koko, who had been taught sign language at Stamford University. Two girls were responsible for his training programme and one of them asked Koko which one of them he liked the best. Koko's answer indicated that – IT WASN'T A FAIR QUESTION.

... To me, his candour and delicate restraint from offending either of the girls, shows much more than his ability to communicate.

Reasons and logic are given as the ultimate reasons that hold human life above all other life forms. Our respect for logic has taken us down a narrow track of truth according to its own code.

The intensity to specialise, simplify, distillate, reduce and observe, separates us from the cohesive holistic passionate

humans that we are. When knowledge is no longer accountable, and compassion and sensitivity become – 'missing links' – how do we hold ourselves above any life?

JENNIFER Ballina, NSW

Dear Editor,

I have found 21 • C to be a strange mix since it was launched – one moment a new-age hodge-podge, (*Dreamlife*, issue 3) the next, a hard-hitting look at the fears and hopes of the future (*Technofear* in issue four).

I wait for the next issue wondering more than anything what direction it will take. Please make it tougher – the future needs direction more propheteering (sic).

ALAN ERICSON, Hobart, TAS.

READER SURVEY

We're offering prizes to find out what you think about 21 • C and what changes you would like us to make to the magazine. In To help us find out more about our readers' preferences, fill in the survey in this edition, fold like an airmail letter and pop it in the mailbox — no stamps, no envelope needed. In And what's more, the first readers whose survey we receive will get a free copy of either the fabulous new all-colour Cambridge Atlas of Australia or Alison Bronoiski's acclaimed book on Australia's impressions of Asia, The Yellow Lady.

Dear Editor,

My sincere thanks and congratulations on your wonderful profile on J.G.Ballard last issue. Like the best sci-fi writers (H.G.Wells, Jules Verne, Isaac Asimov), Ballard tells us more about the future than any social scientist.

Oops, I forgot, it's not sci-fi, but *psych-fi*. Congratulations on the future.

KATE BANKS Brighton, VIC.

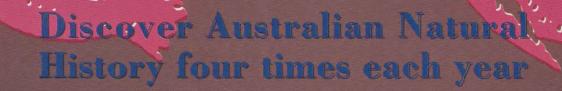
Dear Editor,

For the first time in my magazine reading life I found something of real substance. The section on *The Futurists* in issue 4 was a glimpse of hope in an otherwise bleak pile of futuristic sight seeing. I would like to see your Futurists take over from the government and do something substantial with the world.

BILL KOBLANSKI

WA

21°C, issue 5. The illustration on page 78 was by Faye Maxwell, resident artist at ACGC (Advanced Computer Graphics Centre), Melbourne.





SUBSCRIBE TO AUSTRALIAN NATURAL HISTORY -THE AUSTRALIAN MUSEUM'S AWARD-WINNING QUARTERLY COLOUR MAGAZINE -AND DISCOVER YOUR RELATIONSHIP TO SLIME MOULD; WHY REEF FISH CHANGE SEX; AND WHY AUSTRALIA IS OVERPOPULATED. YOU'LL BE SUPPORTING SCIENTIFIC RESEARCH WHILE BEING AMAZED BY EXOTIC AND EXCITING NEW AUSTRALIAN DISCOVERIES. TO SUBSCRIBE RING: HOTLINE NO 008 028558.



Australian Natural History



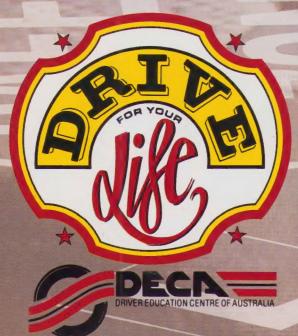


DRIVE FOR YOUR









THE TRAGEDY OF ROAD ACCIDENTS ...

Statistics show that 90% of all road accidents are caused by human error.

A disproportionately large 35% of all drivers killed on our roads are under 25.

These figures clearly show the usual driving programs which are sufficient to get a young driver a licence, are not necessarily sufficient to prevent him or her from being injured or killed in an accident.

Many believe that traffic accidents are one of the largest community health issues facing the 18 to 25's today.

Why are young drivers over represented in crash statistics? A major factor is because they lack the experience and judgement of older and wiser drivers.

BETTER DRIVER EDUCATION ...

It is widely recognised that the best way to reduce these horrifying statistics is to improve the standard of driver education.

One of the features of road safety education is that you can never identify the life that was saved, or the crash that was prevented by that training.

However, Australia is continuing to achieve a reduction in our crash rate. That reduction is as a result of many factors working in concert. They include better designed cars, better engineered roads, more sensible community attitudes towards substance and alcohol usage, more stringent enforcement procedures, a developing community attitude and better driver education.

While those factors are all helping bring about improvement, we must never accept the situation as good enough. We must all continue to do whatever we can to help bring about an even greater reduction in the crash rate.

A JOINT INITIATIVE ...

In an effort to address the problem of high crash statistics amongst our young drivers, a road safety program has been produced entitled Drive For Your Life.

Underwritten by Shell Australia and developed by DECA (the Driver Education Centre of Australia), one of Australia's leading driver education organisations, Drive For Your Life has been assessed and reviewed by an expert panel of learner driver organisations, educationalists and regulatory bodies.

Drive for Your Life aims to promote better driving skills behind the wheel and better attitudes on the road.



WHO ARE DECA ...

DECA is the largest driver training organisation in Australia. Its road safety programs for schools and the community reflect a philosophy of continuing attitude development from childhood to license level and beyond.

DECA has been working with young people for almost 20 years. During that time, DECA has been able to provide driver education for thousands of young people to help them become better, safer drivers.

DECA's specially designed pre-driver programs attract thousands of people each year. DECA also trains Traffic Safety Teachers to extend its reach, however there are still too many young Australians who do not have access to professional pre-driver education.

The Drive For Your Life program is a worthwhile initiative to begin overcoming the problem.

ABOUT DRIVE FOR YOUR LIFE

The Drive For Your Life program provides professional teaching material for road safety teachers or others working with young Australians on the development of positive road safety attitudes and safe driving practise.

It consists of a series of 7 videos presented by television current affairs and news personality, Jo Pearson.

Drive For Your Life includes easy to understand, user-friendly and common sense explanations of the rules of the road, learning to drive, safe driving under varying conditions, emergency situations and understanding your car and how it works.

HOW DOES THE DRIVE FOR YOUR LIFE PROGRAM WORK?

The videos vary in running time from around 20 minutes to over 50 minutes.

We recommend that weekly classes are held over a 7 week period, during which students see the video, and work through the exercises in the class notes contained in the Drive for Your Life Workbook.

This Drive for Your Life Workbook is used by the trainer in conjunction with the videos and provides discussion subjects, demonstrations, practical activities and reviews to be carried out as part of the learning process.

While developed mainly for 15 to 17 year olds, the material is also relevant for older people commencing their driver training later in life.

There are 24 training segments within 7 videos titled

- 1. Getting to Know Your Car
- 2. Lets Get Started
- 3. Up and Running
- 4. Getting Around
- 5. On the Road
- 6. Driving Safely Under all Conditions
- 7. Emergencies and How to Handle Them.

HOW TO HELP ...

There is no doubt that all young drivers could and should benefit from this excellent program. It should be available to all young Australians as an integral part of their driver education.

They need the positive attitudes stressed in the Drive For Your Life program to guide them while they develop the necessary judgemental experience to make them safer drivers

Australia's young people, whoever and wherever are our greatest asset for the future. Too many are still being killed or injured on our roads in spite of our efforts to improve the quality of license training delivered to them. It is in all our interests to do whatever we can to help improve the quality of pre-driver training to these people.

Drive For Your Life can be initiated and /or organised by teachers, parents associations, school councils, clubs such as Rotary, Lions etc. community groups, local councils, driver education organisations, - anyone who cares about saving the lives of Australia's young drivers.

For further information on how to obtain the Drive For Your Life training resource, contact DECA on (03) 819 9555



GO WELL GO SHELL



W N T E R 1 9 9 2 21 C



SPIDER-MAN takesaswing for truth, justice and literacy

David Dale looks at Stan Lee's crusade... is the comic book the last hope for literacy in the 21st Century?

It had to happen, of course. The way comic strips have been going lately, we knew it was only a matter of time before a super hero would declare himself or herself to be gay. Most of us thought it would be Batman. We always assumed that describing Robin as his "ward" was just a 1950s euphemism for the real relationship. But then Hollywood got hold of Batman, made Robin a non-person, and put the Dark Knight into bed with Kim Basinger (and, rumour has it, with Michelle Pfeiffer in the sequel). You have to admire his taste.

So as it turned out, the first hero out of the closet was a fellow called Northstar. who, I must confess, is new to me. He's part of a team called Alpha Flight, published by Marvel Comics, who gave the world Spider-Man, The Incredible Hulk, The Uncanny X-Men, and the Sub-Mariner, and who have always been the most realistic and thought-provoking of the comic creators. In the course of bashing up a villain in last March's issues of Alpha Flight, Northstar declared: "Do not presume to lecture me on the hardships homosexuals must bear. No-one knows them better than I. For while I am not inclined to discuss my sexuality with people for whom it is none of their business, I am gay."

This revelation would have confirmed all the dire predictions of a psychiatrist named Frederick Wortham, who wrote a book about comics called Seduction of the Innocent, Wortham said comics were destroying the brains and the moral fibre of young people because they "create an atmosphere of cruelty and deceit; stimulate unwholesome fantasies; suggest criminal or sexually abnormal ideas; create a readiness for temptation; and suggest

forms a delinquent impulse may take and supply details of technique". He wrote that in 1953, when the most sinful activity visible in comics was Superman kissing Lois Lane's cheek, or Wonder Woman flying faster than her pilot boyfriend.

I stopped reading comics consistently when I was 12 (except for Mad magazine, which took me through my adolescence), but I've regained an interest in them lately because I'm beginning to think they may be the last hope for literacy in the 21st century. As I watch kids pumping coins into video machines, I wonder if we are about to see a generation of young adults who will not use books or magazines at all. They'll be able to read - instructions on a computer screen, say, or street signs - but they won't want to. They won't see reading as something to do for pleasure and mental stimulation.

I remember my parents pleading "Will you get your head out of that comic and read a book!" Now I feel like yelling at the kids beeping away at Space Invaders: "Will you get your eyes off that screen and onto a comic!"



Take a look at some of the new comics, and if you're over 30, you'll be flabbergasted by the characters and the sentiment they express. They're so wordy, for one thing, and so ideologically correct.

You probably think Captain America ("he fights an ongoing battle for liberty, justice and the American dream") is a fascist thug, a relic of Cold War jingoism. Not a bit of it. In the issue I found at my newsagent the other day, Captain America (who first appeared in 1941) is now defending radical artists against a gang of fundamentalists who want to vandalise their work. He says: "I've fought a lot of paramilitary outfits but none clad like these. Unless I'm mistaken, this is the uniform of that censorship group that started up down south - the Watchdogs!"

My favourite of the current lot is the Silver Surfer: "To save his planet, Norrin Radd surrendered his freedom to become herald to the world-devouring Galactus. Coated with galactic glaze, given a surfboard obeying his mental commands, and granted the power cosmic, he now scans the universe, a shining sentinel of the spaceways." Do you get the feeling the authors are not taking this entirely seriously?

pop-psychology from The Uncanny X-Men #290

In New York last year, I met Stan Lee, the venerable chairman of Marvel Comics and the greatest living creator of superheroes (credit him with Spider-Man, The Incredible Hulk, Captain America, The Sub-Mariner, and Dr Strange). He, too, has been worrying about whether the next generation of adults will be readers. "It has always seemed to me that comic books are the last bastion of defence against creeping illiteracy," he said. "These days it's tough enough to get kids away from television or out of the few things that a youngster will read without being forced to. And of course the more a youngster reads, the more he or she develops the reading habit. Nobody just stays with comics. So I always feel that publishing Marvel Comics has been more of a public service than anything else and I'm waiting for our awards."

In the 1950s Lee did battle with the anti-comic forces led by Frederick Wortham, and almost lost. "Wortham said he had done a survey and found that in reformatories, 90 per cent of the kids. were comic book readers," Lee recalled. "He could have said 90 per cent drink milk, or eat chocolate, and make some causal link there. But anyway, he got a lot of press and claimed that if there were no comics we'd all be living in paradise.

"The comic book industry really hit a decline because parents were not letting their children read them, which is one of the reasons we have this terrible illiteracy problem today. The publishers got together and formed a self-censorship group

UNDERNEATH, U'RE AS MUCH AN and we toned down whatever it was that he objected to and eventually nobody listened to him and the world went back to normal and mankind survived." I wondered if Lee approved of the cur-

rent trend for superheroes to reveal their psychological crises to their readers. "Well, you have to look at who creates them," he said. "In the old days comic books were very simplistic, good guys and bad guys. Our characters have become heavier and more soul-searching in an effort to make them more realistic. The characters are riddled with neuroses and psychoses, and that has helped to introduce comics to older readers who read all sorts of symbolism and deep meaning into things that to us are just adventure stories."

The next step, he says, is more female superheroes. "Men are still predominantly the central characters in the comics, and that may be why the readership is predominantly male. But the women who are depicted in comics now usually have a much more active role to play. They're not just the hero's girlfriend. We have a character called Electra Assassin and Tri-Star Pictures are to do a picture about her. She's a very strong, self-willed character."

As he moves towards retirement, Stan Lee says he is particularly proud of the contribution he made to sound effects.

"Before Marvel, the world was deprived of really sophisticated sound effects. If a villain hit a hero, it would say BAM or SOCK or POW. I wouldn't subject you to sound effects like that."

"We would come up with effects like FTPOOOM, and maybe with an E at the end or even a B. I used to get a kick out of making these up and I started writing little notes to the reader. There'd be an asterisk after the sound effect with a note at the bottom of the panel saying 'Obviously in FTPOOOM the third O is silent!"

Soon after I met Stan Lee, Marvel made a big fuss about the re-release of some characters he created in 1963 - the Uncanny X-Men, who have names like Cyclops, Beast, Iceman, Marvel Girl and Angel. They were joined by new heroes called Wolverine, Colossus, Psylocke and Gambit. The first issue of the new X-Men.

comic series sold 6.5 million copies in the United States alone. Maybe there's hope for literacy after all.

David Dale's last column for 21 • C vas on Hong Kong's Geomancers.



Commonwealth Environment

Coordinating a National Approach

The responsibility to care for Australia's environment has long been recognised by governments at all levels. Environment problems such as water and air pollution and land degradation have no regard for State and Territory boundaries.

Protection of air, water and land is vital to us as individuals and to the nation as a whole. To meet this challenge the Commonwealth Government has set up an agency to help in developing a consistent national approach to environment protection.

Called the Commonwealth Environment Protection Agency (CEPA), the new body is part of the Department of the Arts, Sport, the Environment and Territories. The Executive Director of CEPA is Dr Ian McPhail, formerly the Director-General of the South Australian Department of Planning and Environment. He took up his post in February 1992.

CEPA's work is based on a collaborative approach. The shared information which will come to it from all levels of

government, business and the community will be an excellent base for Commonwealth participation in forums within Australia and overseas.

As well as CEPA a Ministerial Council, the Environmental National Protection Authority (NEPA), will be established. It will consist of one Minister from each of the States and Territories with Commonwealth Minister for the Environment as the chairperson. The proposal to create NEPA is a result of the Intergovernmental Agreement on the Environment which establishes ground rules under which the Commonwealth, State, Territory and Local

Governments will interact on environmental matters.

CEPA will represent the Commonwealth's broad interests in this new nationally coordinated approach to environment protection. It will provide major support for NEPA and for implementing Ministerial decisions. With NEPA, it will work in close collaboration with the States and Territories and with particular interest groups such as voluntary conservation organisations, industry etc. on national environment protection.

A national approach coordinated by CEPA will help to ensure that the by-products of our modern life do not pollute and degrade the world around us.

CEPA's immediate priorities include: introducing waste minimisation and recycling strategies; implementing the Environmental Choice Scheme, which is designed to give consumers reliable information about environmental claims for products; developing a national approach to the rehabilitation of contaminated sites and clean up of polluted waters; improving environmental impact assessment processes; and reintroducing state of the environment monitoring and reporting.

CEPA has an active information and public education role which is helping to inform consumers and businesses alike about the environmental impact of their decisions. Increased awareness

and expertise will enable them to plan their activities so that they can safeguard the environment as they pursue their business.

CEPA's work should help greatly in co-operative arrangements between all levels of Government, throughout the private sector and with individual Australians. In its work, CEPA is seeking to develop the closest possible links between State and local governments, industry and community groups.

Reduce Reuse Recycle.

Australians are worried about the wastes that surround them and the pollution that is becoming an unacceptable part of their lives. They need the three Rs in their lives more than ever before; those skills which are basic to environmental protection. REDUCE REUSE RECYCLE — this is the lesson we all have to learn in order to minimise wastes, avoid pollution and protect our world as we know it.

The Australian community needs a commitment to avoiding waste as well as recycling and reusing the waste that is a by-product of the way we live. The Commonwealth Government as part of our community is working for a new approach to waste

generation. In June 1991 the Government published A National Waste Minimisation and Recycling Strategy Public Discussion Paper. A review of the submissions generated by this document was published in December last year. The National Strategy is due for release in mid 1992.

The Government's new environment monitor, the Commonwealth Environment Protection Agency (CEPA) has waste minimisation amongst its top priorities.

The strategy recognises current problems, identifies existing barriers to cleaner production and to reducing waste and lists the opportunities and benefits which a



Minister for the Arts, Sport, the Environment and Territories, Ros Kelly, and Clean Up Australia Chairman, lan Kiernan, launching the Clean Up Day bookiet 1992.

national approach will bring.

It aims to:

- conserve resources, particularly non-renewable resources;
- reduce potential hazards to human health and the environment posed by pollution and wastes; and
- maintain or improve environmental quality.

These goals can be realised by changing production techniques, consumption habits and disposal activities to achieve:

- greater efficiency of resource use;
- · less generation of waste products; and
- more reuse and recycling of these wastes.

We can all help to reach these goals by having a closer look at the ways waste occurs in our lives. Waste is not just an unavoidable end product of manufacturing or consuming. The simple act of turning off unnecessary lights or installing long-life low energy-light bulbs avoids waste at a number of levels. These include less worn out light bulbs to dispose of or recycle, less power generation to make the bulbs and run them longer, less coal consumed and less greenhouse gases.

The impact of waste on our environment is a primary constraint on manufacturing and consumption. The problem of burning coal to produce electricity is not the worry that we will

Protection Agency

run out of coal. The problem is coping with the greenhouse gases which coal burning produces.

The difficulty in providing for mankind into the future is not in finding the raw materials for our consumption; it is in managing and reducing the wastes that our production and consumption creates. We are running out of space for waste.

For these reasons the waste minimisation strategy clearly identifies waste management priorities. In order of preference,

- avoiding waste (practices which completely eliminate waste);
- reducing waste;
 reusing waste;
 recycling or reclaiming waste (where valuable components are used in other processes);
- treating waste to reduce hazard or nuisance (preferably where it is generated); and • disposing of waste.

Waste avoidance, waste reduction, waste reuse and waste recycling are always preferable to waste treatment and waste disposal.

In simple terms, if Australians reduce, reuse, recycle and buy recycled, both as consumers and producers,

government, industry, the community and environment will all benefit.

For industry, these benefits include more efficient processes leading to less cost, greater consumer acceptance of products and creation of domestic and export opportunities.

The rewards for the Australian community include not only a cleaner environment, better use of nonrenewable resources and fewer potential health hazards, but also creation of job opportunities in new waste

management industries which will treat wastes to produce usable materials or minimise environmental impact.

If we are to minimise waste we must continue to investigate uses for otherwise non reusable materials. They should only be regarded as waste when no further practical uses can be found

One of our compelling needs is to design products which can be recycled efficiently and can be made from waste material. We also need to generate markets for these products.

Our major concern should be to avoid waste completely but where this is not possible we must live by the three Rs which will become the credo for the 21st century - reduce reuse and recycle.

Environmental Choice Australia

When is green really green? As our Australian community's environmental sensitivity increases we are seeing more and more environmentally responsible claims for the products on our supermarket shelves.

Clever producers are harnessing our concern for the environment to promote their products. But are all their claims true or even relevant to our concerns for a safer, cleaner world? Public concern, disbelief and growing cynicism about so called green product claims have prompted Government action.

Last year, all Governments in Australia worked together to develop the Environmental Choice Australia program.

On 13th April this year the Minister for the Arts, Sport, the Environment and Territories, Ros Kelly, announced the first manufacturers and products to join the program. Environmental Choice Australia is an Australian and New Zealand Environment and Conservation Council (ANZECC) program which is administered by the Commonwealth Environment Protection

The program introduces a voluntary system through which independent panel of scientists can examine the validity of product claims to ensure labelling is not confusing, misleading or meaningless.

Manufacturers who choose to be included in the program pay a fee to have their product claims verified. Once a manufacturer's environmental claims have been verified, the conditions of agreement signed and the appropriate fee paid manufacturers can use an "agreed form of words" in association with those environmental claims which have been checked for

Look for the Environmental Choice Australia

packaging. Consider alternatives to disposable products which are

thrown away after a single use.

Look for products which have their contents listed on the label. Find out which ingredients are harmful to the environment - call 008 803 772. Avoid buying products which include these ingredients.

Choose products in packaging which you can either se or readily return for recycling.

Prefer products made from a significant proportion of

truthfulness by Environmental Choice Australia.

The agreement contains a code of ethics which ensures that their product claims can be checked by a form of testing, e.g. "contains no formaldehyde". Their claims must also rely on a set of definitions for the words they use such as "100% recycled". They can then pay an annual licensing fee and include the Environment Choice Australia identification on their product label.

So the choice for Australian consumers is now much clearer - if a product displays the Environmental Choice Australia

identification, you know the environmental claims it makes have been verified as being truthful.

The first manufacturers to join the program have submitted products for independent checking of environmental claims and have had them accepted by the scientific committee. Other manufacturers are waiting to join the program and will be announced soon.

Environmental Choice Australia will also carry out random checks of the environmental claims made for any products being marketed in Australia. Manufacturers who make false product claims may be prosecuted under the Trade Practices Act or State or Territory consumer protection legislation.

Under existing legislation individuals face fines of up to \$20 000 and corporations up to \$100 000.

But product labelling is not the only role of Environmental Choice Australia. The program is also actively educating consumers and producers to help our environment in such ways as saving energy through reducing, reusing and recycling wherever possible.

All of us can help by becoming environmentally aware shoppers in our supermarkets.



GOOD-BYE

When I arrived home from work I discovered that my biosphere had died. What a hell of a way to start the week!

On looking back through the records, the reason was not hard to discover. A classic greenhouse-effect problem. Next time I'll wind down the fossil fuels a little more so my globe doesn't cook itself to death while I'm out.

Fortunately the biosphere in question is only a simulated one. I have this program running on my home computer called SimEarth, which lets you model all kinds of biosphere conditions over a number of different time frames. The one I think I'm getting a little obsessed with is a model of planet earth from 1990 onwards. I set up this model every morning, selecting types and quantities of energy use and expenditure. I come home every evening and see if my earth is still running. Sometimes it is, sometimes it isn't.

There's something a little eerie about having a functioning biosphere in your home; something rather more disturbing about finding the thing has gone kaput while you were out. SimEarth lets you choose from a number of energy sources, including biomass, hydroelectric, solar, nuclear or fossil fuelled. It also lets you program a range of energy uses, including science, agriculture, medicine, and the

arts. Each of these has different effects.

If you expend energy on agriculture, population increases rather more rapidly. If you devote more resources to science, technological change takes place rather more quickly. Some of these assumptions are of course crude, but not unreasonable.

Naturally, a home biosphere is relatively simple compared to the real thing.

The curious thing about it is how fiddling around with these crude variables gives you a feel for the global impact of fundamental choices about energy use. For example, I set it up one morning with settings which devoted a lot of resources to medicine and agriculture. When I got home from work I found that the population had shot through the roof. That one was predictable, I guess. What I hadn't counted on, though, was that increasing agriculture pumped out more greenhouse gases. The temperature was ever so slowly rising, threatening to toast everything, unevenly but very crisply brown.

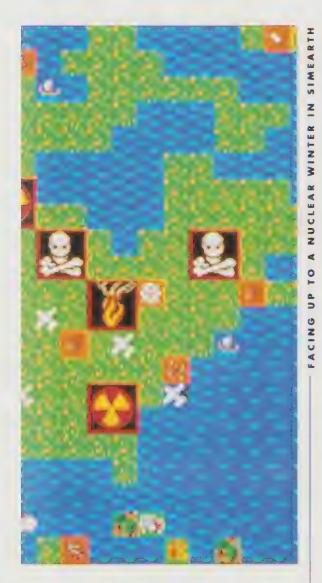
I was curious about this one, so I looked it up. It seems that methane is one of the gases that causes global warming. A bit too much methane in the air and heat gets trapped in the atmosphere. It seems that by



dialling up more agriculture, I was also increasing the amount of methane going into the atmosphere. This is because rice paddies are one of the sources of methane. It seems that deep in the muck at the bottom of rice paddies are little bacteria that produce methane as a by-product. Great! There I was, only this morning trying to see to it that all the people on my biosphere are well fed, healthy and get plenty to eat, and by dinner time I'm cooking the biosphere.

This was all a bit too much, but fortunately I was going out to dinner. Thai food — my favourite! I thought this would take my mind off my biosphere problems, but all that food on the table made me lose my

SPHERE By McKenzie Wark



appetite. That big silver dish with all that rice in it just made me think of over-cooked biosphere. The beef red curry, delicious though it was, only made things worse. It seems that one of the other sources of methane in the world is, of all things, cow burps. Yes, cow burps.

It had never occurred to me that there would be the slightest global significance in the fact that cows burp. The thing is, they burp methane. Well, not the cows exactly, but the bacteria in their stomachs that break down all that grass. Those bacteria, like their little friends in the rice paddies, make methane. It makes sense, given that in China they actually use pig farts as a source of power. They collect it

and bottle it and use it for cooking — probably a nice pork and black bean sauce with lots of rice.

So when I programmed my little biosphere with great health care and lots of food production, I was also selecting a higher rate of methane output. It just goes to show how you have to think about all of the consequences of anything you do. Good health care is a great idea, everybody should have that, but without some sensible and humane form of population control it means more people, and more people means more land under cultivation, and that means more methane, and that is a bit of a problem.

So the next time I set up SimEarth I set it up a bit differently. Rather than concentrate on expanding food production in the short term, why not put more resources into science and technology instead? In fact, why not go for maximum productivity? Damn the torpedoes, full speed ahead! This was a bit of a gamble, I thought to myself as I drove off to work. What if science didn't come up with the answers in time? What if burning up fossil fuels at a rate of knots didn't kick progress along fast enough? What the hell is progress anyway? SimEarth was starting to become a bit like a daytime soap opera where I would just catch the last episode of the series after driving home from work, and this one was a real cliff-hanger.

The last of the series, in fact. By the time I got home, SimEarth had reverted to what it calls 'geological time'. There was nothing left alive, so my planet was just ticking over, waiting eons for life to mysteriously happen again. Hmmm. Let's see: pollution up, oxygen levels down, carbon dioxide up, temperatures sky high. It seems the techno-gamble didn't quite work out. It

seems that cranking up the whole global economy to the max, pumping out and burning up every source of energy as fast as possible certainly did increase the pace of technological change, but in this scenario, it increased the rate of global change even faster.

The problem wasn't the methane this time. By keeping population and food production growing a bit more slowly it seems I had kept my little green earth from spinning out into that scenario. The problem this time was the carbon dioxide. There it was on the graph — shooting up at a devilishly sharp tack, taking temperatures up with it. The problem seems to be the fossil fuels - burning up all that oil and coal. This produces carbon dioxide, among other things, and when you increase the amount of carbon dioxide in the atmosphere, you turn the toaster on again. Like methane, it traps the heat from sunlight. What a bummer.

The really sad part was that all the way home in the car I had been really eager to see if my little gamble had paid off. Little did I realise that it was doing exactly that — driving — that was part of the problem. So many of our industries, so much of our transport burns up fossil fuels. I had always thought that if the economy in the real world cranked along at maximum efficiency, then technology would also bobble along at a rate sufficient to deal with the little problems that might occur along the way. Well, maybe. What SimEarth was saying to me was that like most people, I had always taken this on faith. What happens though if the little problems aren't just accidental by-products — a little oil spill there, a toxic waste disaster there — what if the industrial race itself was mucking up the global conditions of its own success? A

It had never occurred to me that there would be the slightest global significance in the fact that cows burp.

disturbing thought indeed. Alright, so maybe I'd be third time lucky. Let's ease up on the population expansion and the use of fossil fuels and see what happens. I know, let's go nuclear! Maybe this is the way to have the best of both worlds, so to speak. Lots of energy to keep industry and technology cooking, but without turning on the greenhouse toaster.

Well, this time there was good news and bad news. The good news was, my biosphere didn't cook this time. I had well and truly solved the greenhouse problem—permanently. Rather than overheat it, I

Geosphere Model

Freshin

Fres

accidentally shoved it into the deep freeze. It's called nuclear winter — and it results from letting off a few too many thermonuclear devices. The dust cloud from that keeps the sunlight out altogether. So how did this happen? Well, I gave my little SimEarthlings not only a great source of power, but a dangerous weapon. It was not as if I had taken away the sources of potential conflict, however. It seems they just started blasting away at each other. It's hard to tell where it started, although the radioactive patches seem to last through a few eons-worth of the subsequent 'geological' phase. You can see little nuke signs, carved on the brown stump of a formerly green planet, like graffiti carved in trees that says 'we were here'.

Still, it's not hard to imagine it starting.

On the news there were fresh reports from Iraq about how UN investigators had found facilities dedicated to developing such weapons, and another report on how the break up of the Soviet Union was going to leave bits of the former Union's nuclear arsenal in several different states. Watching all this on TV made me think about how quickly history can change, how old rivalries can give way to new ones. I'm not in the habit of giving small children loaded guns, so I guess I'll refrain from giving my SimEarth the global equi-

valent, because there at least I have a clear choice about it. I just have to make a mental note to dial it down a bit.

It's not much of a game, SimEarth. You never get to win. The best you can do is keep the ball spinning as long as you can. I sure learned a

few things, though. Like there are no quick fixes. Absolutely every way that people use up the energy and resources of a planet has its effect somewhere else in the system. Of course, the real planet earth is different to simulated ones you can grow on your desk. They're a lot more complicated, for one thing. Still, the idea of SimEarth is pretty simple but pretty true: what goes around comes around. Didn't our grandmothers always tell us that? Well, gran was right. What goes around comes around. Maybe we had all better think about what is going into our social and industrial processes; and what is coming out of them in the end. McKenzie Wark lectures in communications at Macquarie University, his last story for 21 °C was on 'Technofear'.

Living in Sim

Before SimEarth there was SimCity.

A place where good and evil could take hold at the behest of the person playing the game. A town planning-like package, SimCity, could be a computerised Sodom and Gomorrah. As mayor of your own designed city (or the seven famous preprogrammed ones all ready to be governed) you can take action against disasters, pollution, crime, traffic, and urban decay.

The company that begat these titles, the US based Maxis corporation, uses the principles of artificial life (imitating living systems through software) to create its 'best/worst case' scenario video games. After reading James Lovelock's Gaia hypothesis, which treats the earth as a single self-regulating system rather than as separate systems of biology, geology climate and human culture, Maxis' Games Designer, Will Wright, programmed SimEarth. Both programs have won numerous awards and been on the best-seller lists since they were released. Future releases include SimAnt (where you struggle to survive as an ant amongst the many predators in an ant colony) and A-Train (where you develop a city with a railroad as the transportation hub).



Marsupials make evolutionary leap

ossil discoveries found recently in southern Queensland by a University of New South Wales team are causing a dramatic reappraisal of the history of life in Australia, according to a report in Nature magazine.

These findings suggest that marsupials are not, after all, special evolutionary cases or even weaklings which were protected from more aggressive animals by the oceans.

Marsupials like the kangaroo, koala and wombat give birth to their young soon after conception and rear them in external pouches.

Though a few marsupials are found in Papua New Guinea and South America, this protective isolation theory seemed to be confirmed by the lack of marsupials living today on northern continents, dominated by mammals whose embryo develops fully until birth in the womb on the placenta.

Scientists assumed that placental mammals – like the rat, sheep, elephant and human (or their evolutionary predecessors) – were more advanced

and successful in evolutionary terms.

Nowitseems that, between 38 and 55 million years ago, the marsupials utterly out-competed placental mammals on Australian soil and drove them to extinction. This conclusion comes from one tiny tooth, little

larger than a pin-head, found in 25 tonnes of clay. The tooth was found after sifting clay debris at the University of New South Wales by

doctoral student, Henk Godthelp.

The animal which grew the tooth was smaller than a rabbit and larger than a shrew. Dying in shallow, gently running water, it now goes down in scientific history as the first placental mammal to be discovered in Australia. The shape of the tooth is similar to the condylarths, a group of primitive placental mammals which were ancestors of deer, horses, sheep and cattle.

The clay has been accurately dated to 55 million years and contains a prolif-

eration of fossil remains. All other fossils found to date have come from marsupials with quite different teeth. This age places the Queensland deposit and its animals well before the drifting apart of the southern supercontinent of Gondwanaland, which joined Australia with South America and Antarctica, between 38 and 45 million years ago. It means that placental mammals and marsupials were co-existing in Australia when placental mammals were evolving elsewhere.

Until this discovery, the conventional view was that Australia's marsupials were somehow backward and were protected from the larger group of supposedly more advanced mammals by the separation of the continent. Left to themselves the marsupials were supposed to have filled the available ecological space. It was also

> theorised that if placental mammals had reached Australia they would have driven the marsupials into extinction, or marginal spaces at best.

Team leader, Professor Michael Archer, said: "All our finds in various fields in Queensland are weakening a European-centred view of evolution. In fact, Australia played a more significant role in the exchange of life forms with the rest of the world than others have realised."

The Australian team have also identified another remarkable fossil tooth, this time found by Argentinian scien-

tists in Patagonia in the south of Argentina. Until now the amphibious platypus and the spiny echidna, which are egg-laying mammals known as monotremes were only found in Australia and Papua New Guinea.

They have shown that the tooth from Patagonia came from a 60 million year old monotreme related to the platypus. This discovery suggests that the monotremes were once widespread over the supercontinent of Gondwanaland. And lends further support to the view that marsupials and monotremes are classes of mammals equally as successful as placental mammals.







Astronomical stamps

set of Australian postage stamps marking International Space Year has carried pictures from out of this world around this world. The stamps are based on spectacular photographs taken with two telescopes from the Anglo-Australian Observatory.

Dr David Malin is the photographer who shivers his way through the cold nights at Siding Spring Mountain in northern NSW doing what few contemporary astronomers now do, actually peering at the stars with naked eyes and taking pictures of them.

Dr Malin's passion for photography, however, is matched by his astronomical expertise. ABOVE: STAMPS RELEASED BY AUSTRALIA POST COMMEMORATING THE INTERNATIONAL SPACE YEAR 1992. DEPICTED (FROM LEFT TO RIGHT) ARE: THE HELIX NEBULA, A FLOWER-LIKE CONFIGURATION OF DUST AND GASES, JETTISONED AND ILLUMINATED BY THE DYING STAR, NOW ONLY A PINPOINT AT NEBULAR CENTRE; THE PLEIADES, A CLUSTER OF STARS 400 LIGHT YEARS FROM EARTH; AND SPIRAL GALAXY NGC 2997, COMPRISING MILLIONS OF STARS AND SIMILAR IN SHAPE TO OUR OWN GALAXY, THE MILKY WAY.

It's not just pretty pictures he obtains, but images which yield a wealth of information about galaxies. He says the southern hemisphere is a splendid platform for photographing the heavens, and is the only place from which many important astronomical objects can be observed.

His method of getting colour pictures of the universe is unique and his work is widely published. He does not use colour film – each picture is made up from three separate black and white negatives exposed in blue, red and green light.

Leaping larva

In his Johannesburg garden David Maitland was amazed to see maggots leaping away from attacking ants. From this acute observation Dr Maitland has been able to claim discovery of the world's first known example of a legless organism with a soft body which can jump through the air. The maggots thrust into scientific fame are larvae of the Mediterranean fruit fly, ceratitis capitata.

"In my garden, on six out of nine encounters", he wrote in *Nature*, "ants attacking larvae were thrown off during the maggot's explosive jump. The ants subsequently failed to relocate their prey which landed several centimetres away."

The leaping larva is not Dr Maitland's first unusual discovery in natural history. While working in Australia he found a crab which gives birth through its legs.

The maggots' leap is entirely surprising, as crawling by caterpillars is slow and uses up a lot of energy in comparison with the movement along the ground of animals with a rigid skeleton internally (like the vertebrates) or externally (like the insects).

When it jumps, the Mediterranean fruit-fly larva moves at 50 centimetres a second, 200 times faster than it travels when crawling. To find out how it achieves this, Dr Maitland took slow-motion videos of the maggot's leaping action.

He found a grub gets ready to jump by curling up and using its muscles to pump up a relatively enormous pressure of fluid inside its soft body. When released, the pressure causes the grub to straighten out, leave the ground and perform a backward somersault. As it flies through the air, it tosses off any ants which had attacked it. The grubs, which are about 8 mm long, reach a height of 7 cm and travel a distance of 12 cm.

They say Australians will bet on anything that crawls. Maybe, David Maitland has started a new sport of betting on larvae leaping.

Vaporous Diagnosis

fter the success of Dr Bill Burch's Technegas in detecting clots in the lung, it seems that by adding oxygen into his basic technique, a method for diagnosing one of the complications of AIDS may have been found.

In the earlier process, heating pure carbon (in the form of graphite), together with a drop of the mildly radioactive element, technetium, in an atmosphere of argon gas, produces a vapour ideal for penetrating into the finest parts of the lungs. Tell-tale pictures of damage can then be easily generated.

Combining with Mr Ian Tetley, a mechanical engineer, they have been marketing a Technegas generator which has now been



ABOVE: DR BILL BURCH INSERTS A GRAPHITE CRUCIBLE IN THE GENERATOR WHILE MR IAN TETLET SHOWS HOW A PATIENT INHALES THE GAS. BELOW: THE GRAPHITE CRUCIBLE AT THE HEART OF THE TECHNOGAS GENERATOR. (PHOTOGRAPHS: PETER POCKLET)

sold, or is under trial, in 23 countries. Sales of the machines and the disposable devices for patients will be worth more than \$62 million over four years.

Dr Burch said that addition of oxygen to the argon gas in the generator has opened new possibilities for diagnosis.

"Pertechnegas", as the new vapour is called, is undergoing clinical trials in two hospitals in the USA for quick and sure diagnosis of pneumocystis pulmonari, a complication of AIDS which can be treated if identified early enough. Pertechnegas is also being tested at Sydney's Concord Hospital for diagnosis of lung infections in organ transplant patients whose immune system has been suppressed with drugs.

Solar cells with punch

The most efficient solar cells in the world for directly converting the energy of the sun to electricity have been developed by Professor Martin Green's team at the University of NSW.

The laboratory versions have now moved into commercial reality with the first export orders, worth \$1 million, of "Green cells" to Japan – a modern day twist on "shipping coals to Newcastle".

The Green cells being made today at UNSW's pilot plant are more efficient than UNSW-licensed cells which powered The Spirit of Biel, winner of the 1990 Darwin to Adelaide solar car race. Those cells, made of silicon, converted light into power with an efficiency of 17 per cent. The cells being sold to Japan are over 20 per cent efficient.

Green and colleagues have made cells which are over 23 per cent efficient and believe they can push this up to 25 per cent. The secret to their success is a special grooving with lasers which makes pyramid shapes on the surface of the cell and traps the light to extract every photon of energy.

For his achievements in solar cells, Professor Green won last year's Eureka Prize for Environmental Research.



Bed behaviour

Science has proven what most of us already knew from those morning bruises inflicted by loved ones. The first thorough study of sleeping positions, has come up with the startling conclusion that everybody tosses and turns in bed, but the number of movements per night reduces with age.

Using time-lapse photography the Canadian study discovered that while most people fall asleep in a favoured, comfortable position, their positions thereafter become involuntarily contorted. Personality they argued was not an issue.

A typical adult in the 18 to 24 age group turns, rolls and extends limbs nearly 30 times a night. Young children change positions more than twice as often as people in the 65-75 age bracket, but even they move, on average, twice an hour.

Another difference between the ages is that, as they get older, people sleep increasingly on their right side and abandon sleeping on their stomachs.

Publishing their findings in the American journal, *Sleep*, the psychologists suggest that sleeping on the right side may be easier on the heart, but this is yet to be proven with further studies.

From gene shears to viral shears

Refining the gene shears technology developed by CSIRO scientists three years ago, molecular biologists in another CSIRO division have discovered a range of new molecules which can destroy viruses, Dr John Stocker, chief executive of CSIRO, announced recently.

The tests, which have only been conducted in test-tubes to date, have selectively targeted a number of RNA molecules (or ribonucleic acid) including material from viruses. Among the types of RNA successfully attacked was that from the HIV virus which causes AIDS. But Dr Stocker qualified: "We haven't got anything which could be tested on humans. We are talking about complicated chemical reactions in a test-tube. We have nothing yet which can help AIDS patients or people infected with the AIDS virus or any other virus."

CSIRO believes that Dr Phil Jennings and colleagues in Sydney have made a discovery which will help in designing pharmaceuticals to attack specific diseases. The commercial implications of the discovery are such that few technical details have been released.

"We have to purpose-build a molecule for each specific RNA we have targeted," Dr Jennings said, "but, so far, we have been able to cleave every RNA we have wanted to. Once its RNA is cleaved a virus becomes inactive."

The new type of molecular scissors, called a "minizyme", is a significant refinement of the "gene shears". Their molecule, called a "ribozyme" which has a hammerhead shape, has triggered joint investment in Australian-based research between CSIRO and two international companies (Johnson & Johnson of the USA and Groupe Limagraine of France). The commercial collaboration is aimed at developing human and agricultural applications.

A minizyme is about two-thirds the size of a ribozyme and more stable. Dr Jennings says further

CONTINUES PAGE 20 >

OH, better keep southern air cleaner

t is hard to believe that one tiny molecule which is present in only one in every 100,000,000,000,000,000 molecules in air, has a profound effect on the levels of pollution in the atmosphere. It is even harder to believe that scientists are able to measure such quantities.

The hydroxyl radical, which has become known as the atmosphere's "detergent", cannot be analysed directly by the most

sensitive instruments. But a group in New Zealand has now found a way to measure hydroxyl indirectly and their results are challenging the basic assumptions of atmospheric chemistry.

They have found hydroxyl is keeping the air much cleaner in the southern hemisphere than in the north. There does not appear to be enough of the 'detergent' to clean up the increasing load of contamination in the north, but the scientists warn there is no reason for complacency in this part of the globe.

The hydroxyl radical is one of the simplest combinations of atoms possible – one atom of oxygen combined to one atom of hydrogen, or OH. It is called a radical because there is a spare electron on each OH, making it one of the most aggressive molecules, chemically speaking. Hydroxyl reacts extremely fast with molecules of common pollutants like the hydrocarbons (methane, ethane and propane) and carbon monoxide.

This is why hydroxyl is so rare. No sooner is an OH radical formed than, in less than a second, it reacts with another molecule, controlling the level of contaminants in the air. Hydroxyl is regenerated each day in the atmosphere by the action of sunlight on ozone (O₃) and water vapour (H₂O).

In a recent paper published in *Nature* magazine, Dr Carl Brenninkmeijer, Dr Dave Lowe and colleagues say OH provides clues to one of the big puzzles of global pollution; why the air is so much cleaner in the southern hemisphere than in the north. One would have thought the continual stirring of the atmosphere by wind and weather would create a more



uniform spread of pollution around the globe. So far, however, this has not occurred.

The Wellington scientists made their discovery by comparing air sampled from Germany and New Zealand. The method they use depends on the fact that carbon monoxide (CO) is broken down only by hydroxyl, making it an especially valuable indicator of the levels of the rare OH radical.

Carbon monoxide, with carbon in the form of the naturally occurring and mildly radioactive isotope, C-14, is used as a 'tracer' to give values for hydroxyl.

Then a tandem accelerator, an extremely sensitive instrument for measuring levels of isotopes like C-14, analyses the carbon monoxide extracted from the air samples. (An accelerator with a similar capability was recently unveiled at the laboratories of ANSTO at Lucas Heights in Sydney.)

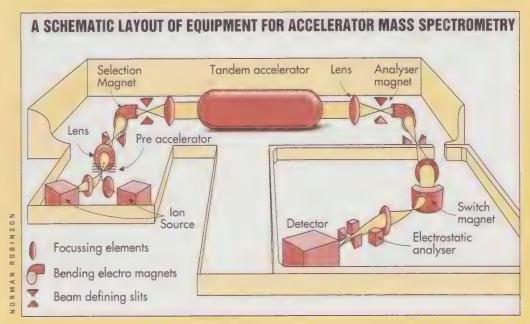
The reasons for the differences in hydroxyl levels between hemispheres Dr Lowe says, " is almost certainly due to the phenomenal load of pollution in the northern hemisphere. As hydroxyl combines with polluting molecules there is less of it around to mop up more pollution".

As the New Zealanders are starting to tell colleagues of their results, they sense a controversy building because the true levels of hydroxyl are crucial to all calculations necessary for understanding the chemistry of the air.

Until these first measurements of the levels of hydroxyl, atmospheric scientists have had to rely on mathematical models which have assumed certain values for hydroxyl.

Yet, as Dr Lowe says: "The differences (between the models and actual results) are so large that the whole house of cards making up atmospheric chemistry will come falling down. This is why it is important for more measurements of hydroxyl to be made to confirm and refine our data."

INSET: TANDEM ACCELERATOR AT THE LABORATORIES OF ANSTO IN SYDNEY.
BENDING MAGNET IN FOREGROUND, PRESSURE VESSEL BEHIND.



THE PRACTICAL

APPLICATIONS RANGE

FROM CHEAPER GENERA-

TION AND DISTRIBUTION

OF ELECTRICITY TO MORE

POWERFUL INSTRUMENTS

AND RAIL CARS LEVITATED

FOR MEDICAL IMAGING

WITH EXTRA-STRONG

MAGNETS

ne of the great dreams of scientists, the development of wires which will conduct high currents of electricity with zero resistance, is several steps closer as a result of world-leading research by a group in Wellington, New Zealand. One of their materials has carried a current density which is a record 240-times better than copper.

The practical applications range from cheaper generation and distribution of electricity to more powerful instruments for medical imaging and rail cars levitated with extra-strong magnets.

The world-wide market for superconducting materials now has an annual worth of about \$750 million and is expanding rapidly.

Superconductivity has been known in a number of metals and metallic compounds since it was first observed in 1911. It relies on being below a certain threshold level, or transition temperature, above which the material offers resistance to electric currents.

Until recently, superconductivity remained a laboratory curiosity because of the expense of cooling the materials below their transition temperatures which required liquefied helium

gas (-269°C or 4 degrees above absolute zero). It was not until six years ago that several ceramic materials were discovered with relatively high transition temperatures, allowing them to reach superconductivity with cheap, liquid nitrogen (77 degrees above absolute zero or -196°C).

Nitrogen can be liquefied from air using simple refrigeration methods and, unlike liquid helium, is readily available.

Laboratories all over the world entered an international race to find new materials with higher and higher transition temperatures. Records were being claimed al-

most monthly for ceramic materials made of copper and oxygen with combinations of other metals, mainly yttrium, barium, calcium, bismuth and thallium. Around 30 ceramic compounds based on copper have been made which have been found to be superconducting.

The excitement level was high as engineers began to think of the practical applications. The race for higher transition temperatures was paralleled by a race for patent protection as big business backed the research.

But, the early hopes were dashed when researchers were unable to fabricate the high temperature materials into wires which would support large currents without losing the precious property of superconductivity.

Here is where Dr Jeff Tallon's team at the NZ Department of Scientific and Industrial Research, in collaboration with laboratories in Europe, USA, Canada, Japan and Australia, has achieved some significant successes.

Tallon says the Kiwi team has the broadest program in superconductivity in the southern hemisphere. They are so competitive internationally for high temperature materials that they are confidently defending an application in the US Patent Office for one of the most promising types of superconducting materials made of bismuth, strontium, calcium, copper and oxygen.

The New Zealanders have already been granted a prized US Patent for another superconductor. This success is seen against the Patent Office's dismissal of a claim by Dr Paul Chu whose well-publicised group at the University of Houston had been regarded as a world leader in superconductivity.

Late last year Tallon and Ru-Shi Liu of Cambridge University achieved a transition temperature of 128 degrees above absolute zero (-145°C) – an equal record with a Japanese group – with a material made of thallium, barium, calcium, copper and oxygen.

But, the biggest prize would be to develop a flexible wire which could be wound into electromagnets for motors and other devices and which could carry large currents. Here, the Wellington scientists have made great progress by encapsulating superconducting materials inside a silver tube and heating it in a controlled atmosphere.

Then, using standard wire-drawing, they reduce the size of the tube from 5 to 1 mm, bundle seven of them together, reduce the size again, bundle eight of these again and reduce the size until there are 56 filaments in one, fine composite wire.

At liquid nitrogen temperature, their superconducting materials will carry a current of 120,000 amps per square centimetre, which is 240 times better than the

common copper wires with 500 amps per square centimetre.

The key to this success is strict control of the processing of the materials with heat and oxygen (the details are a proprietary secret). Contrary to the drive in other laboratories for perfection and purity in the materials, Tallon said his group has made them dirty and full of imperfections, but in a highly controlled fashion.

Tallon says that there seems to be an upper limit to the transition temperature for the present suite of ceramics of 130-135 degrees above absolute zero. While a search will continue for other materials which will be superconductors at room temperature, Tallon believes that, to be reliable, these would need transition temperatures of around 100°C. These are not around the corner. "For foreseeable applications, it is not essential to have higher temperature superconductors".

The Wellington group has formed a partnership with the Electricity Corporation of NZ to develop the local discoveries. The potential prizes for successful research are clearly well worth the investment.

PETER POCKLEY investigation will reveal its full potential, but he believes his group to be the first in the world to develop such an agent.

The molecule can be delivered to a cell from outside, but works on the RNA inside it. The minizyme is not activated until it combines with its target, a considerable advantage over other anti-viral agents. The smallest of the minizymes is 22 nucleotides in length, RNA molecules, which they can snip, vary in size from hundreds to thousands of times larger. The human genome or DNA is 100 million times larger than the smallest minizyme.

It's a scourge, possums

Forget the minor problem of possums in your walls and short circuiting your house, they are about to take over New Zealand. Since being introduced from Tasmania between 1837 and 1922, to establish a fur industry, the population of 200 has grown to 70 million, occupying 92 per cent of New Zealand.

The brush-tail possum has accelerated past the rabbit as the most prevalent feral animal in the NZ environment and provides the world with one of its worst cases of damage by an introduced species. Up to 20 times more possums can be found per hectare of NZ bush than in their native Australia. Fifteen million new possums are born each year. Just 3 million are culled by poisoning and trapping, the only methods of control available at the moment.

In Australia most bush plants are distasteful to possums, limiting their food supply. In New Zealand, however, the possums have found nearly all plants delicious—"a real fruit salad; they eat through the bush at high speed," says Dr Bob Brockie, a leading ecologist in Wellington with the NZ Department of Scientific and Industrial Research.

"It's a case of evolution speeded up – what took several million years to evolve in Australia has happened in a century in New Zealand as plants have been eliminated from whole mountain ranges," Dr Brockie explains.

Possums not only beat birds to the food but they also eat them as well as insects, driving out the native animals, some nearly to extinction.

Eradication of the pests on the main islands of New Zealand by present methods would be impossible. The massive poisoning programs are expensive (\$14-28 per hectare), effective only in local areas, and, unless sustained, the possums return rapidly.

The export market for possum fur, once worth \$14 million a year, has collapsed with a glut of cheap mink from Scandinavia and the former Soviet Union, making possum trapping a dying trade.

Possum control has been given high priority by New Zealand authorities. The reason is not only ecological devastation, but the direct damage they cause to agricultural and horticultural crops, to erosion-controlling trees and short-circuits of electricity supplies.

Possums cause their greatest economic harm through bovine tuberculosis, a highly infectious disease which they spread into beef and dairy cattle through contact on farms. If present trends continue, cattle herds will be infected throughout the country by 2030. Increasingly, possums are also transferring

giardia, a microbe infectious to humans, to water supplies. Bushwalkers can no longer assume the apparently pristine streams of the mountain country to be pure.

Dr Phil Cowan of the DSIR has estimated the current cost of damage by possums, control and research is \$25 million, but if bovine TB were to spread sufficiently to close down export markets, New Zealand would lose \$350 million of exports to the US alone in one year.

There is an urgent search for a biological method of controlling the population. Introduction of a natural disease of possums has been hampered by the fact that possums are "disgustingly healthy", as Bob Brockie describes it.

Studies of possums in their native environment, Australia, have revealed no natural diseases of any value for control. Scientists are now studying possums native to South America for diseases like *chlamydia* which might offer prospects.

Professor Roger Morris, an Australian scientist leading a research team at Massey University in Palmerston North, is examining the behaviour of 150 possums by fitting them with radio transmitters and following them around an enclosed area. They are also video-taping the interaction of possums and cattle to understand how bovine TB is transmitted.

In the longer term, Professor Morris sees the best prospects in finding a vaccine against bovine TB or in developing a form of birth control. He is closely following work in the US which has identified a gene which turns a female's immune system against the sperm of a male. Professor Morris foresees a 15 year program of research before any lasting solution can be found.

There is the worrying possibility, though, of a payback to Australia for unwittingly providing a scourge in New Zealand. If Kiwi scientists develop a biological control of its possum pests, could the agent be prevented from crossing the Tasman and infecting the protected possums in Australia?

Cool wool, hot market

A new Australian wool spinning technique called Sirospun will capture 20 per cent of the world market—or an estimated \$908 million for Australian woolgrowers—according to a recent survey released by the Bureau of Agricultural and Resource Economics.

Sirospun, developed by a team in Geelong under Dr Dieter Plate, produces yarn which is less hairy than conventional yarn, resulting in a smoother fabric. This makes "Cool Wool" garments possible, giving a new lease of life to the wool industry currently threatened by new synthetic fabrics.

Sirospun replaces the traditional two-stage process of spinning a single yarn and then twisting the two together to give enough strength for weaving. It cuts the cost of the process by 40 per cent.

A SIROSPUN SPINNER AT THE CSIRO WORKS IN GEELONG.

n October Sydney's Powerhouse museum will celebrate the future of Australian industry and manufacturing in the exhibition Success and Innovation: Achieving for Australia.

Ranging from home appliances to hightech computers, the show will cover areas as diverse as medicine, furniture design and technology. An innovative aspect of the displays will be that for the first time in Australia, visitors will be encouraged to use state of the art computer technology to obtain information on the hundreds of inventions.

Once one masters the info hi-tech, displays include Mark Newson's futuristic furniture, Ford's revolutionary car designs and the checking of AIDS thanks to such designs as the Fitpack syringe box.

n issue 4 of 21 • C we reported on new technology with the ability to drown

out unwanted noise. Now Japanese manufacturer Nissan is using this technology to reduce engine noise in cars. Speakers installed in the latest model Bluebirds create 'antinoise' sound waves the reverse of those created by the engine. The computer matches sound waves by combining the peak of one wave with the low point of others of similar strength, thus cancelling out noise.

Scientists have been working on this for over 50 years but its implementation has only become feasible due to recently developed computer microprocessors that can rapidly analyse and neutralise the sounds. The 'active noise cancellation' technology, currently available only in Japan, will reduce noise levels to almost 90 per cent, Nissan claims.

The technology is already in operation to allow easier hearing for pilots over cockpit noise. Similarly, a concert hall in Kyoto is using the equipment to silence ventilation machines, and Toshiba is using it in refrigerators to lessen compressor noise.

In time the technology should become common in homes to potentially cancel such exterior noises as loud stereos, barking dogs or traffic. Perfect for inner city living.



ABOVE: FURNITURE MAKER ECKHARD REISSIG WORKING ON A LOCKHEED LOUNGE, DESIGNED BY MARC NEWSON. NEWSON IS ONE OF THE FURNITURE DESIGNERS TO BE FEATURED IN THE SUCCESS AND INNOVATIONS EXHIBITION.

chools from around Victoria and a large number of environmentally concerned corporate groups collaborated to produce the 3rd National Environment Expo at the Royal Exhibition Building in April.

Students were able to present documentation and presentations of their projects (pictured below) into environmentally sus-

tainable development. Displays covered a wide range of subjects which would have made the Rio organisers jealous – from recycling, endangered species, Antarctica, and Kakadu to agriculture.

The schools' displays sat alongside corporate and business presentations (including solar heating), environmental organisations such as Greenpeace, products for generating energy via

wind power and recycled building and gardening products.

The expo, with the theme 'Caring for our Planet', was hosted by the Australian Commission for the Future and supported by Apple computers and the Victorian State Government. It was launched by the Commission's managing director, Susan Oliver, and former federal Science Minister Barry Iones.



major CSIRO study suggest that Western culture is causing the soaring death rates of aboriginal adults.

Dr Richard Smith completed a study which found alarming rates of high blood-pressure amongst Western Australian Kimberley aborigines. He found that this group suffered from blood-pressure and coronary heart disease almost triple that of the Australian average.

Dr Smith claims that the "increase has happened in the past 25 to 40 years as the aboriginal population has drifted away from its traditional lifestyle towards cities and towns."

Previous studies reveal that death rates from heart disease amongst groups of aboriginal adults are 10 times those of most Australians.

pple computers chief John Sculley is moving computing from the desk top to the top pocket. The new portable machine, Newton, is presented as a computer terminal, fax machine, notepad and diary all in one battery powered, video-cassette sized package.

Newton also recognises handwriting, anticipates frequently repeated tasks, receives radio signals and satellite network information and 'cooks breakfast' (just joking).

The wiz bang pocket genius is expected in 1993, if Sharp who helped Apple develop the machine doesn't beat Apple to the byte.

ony have announced the release of their long publicised mini-disk, a recordable version of the CD. The MD is marketed as a direct rival to the recently announced digital compact cassette, by Matsushita and Philips.

The Economist has questioned the judgement of Sony's chairman, Akio Morita, pointing out that consumers are already bewildered by the proliferation of new products and new formats offered by the electronics industry.

or those who enjoy collecting books, new technology may turn out to be a problem. Author William Gibson, who made his name with the cyberpunk novel Neuromancer (1984), has come up with a joint project that will leave a hi-tech hole in the bookshelf.

With the recently released Agrippa, Gibson and Dennis Ashbaugh (an artist obsessed with computer viruses) have produced a publication in the form of a large portfolio containing Ashbaugh's copperplate engravings of DNA codes and Gibson's story on floppy disk. The disk, when loaded into a computer, will scroll at a steady speed until reaching its conclusion. At that point a virus created by the authors will destroy the text. For slow readers, a mission impossible indeed! To make matters worse, Ashbaugh's engravings are chemically treated so some disappear after exposure to light while others appear on exposure. For this hi-tech pleasure one may pay a minimum of US\$450.

Earthwatching business leaders

arthwatch, the global non-profit organisation sponsored by private investors, has moved its Australian base to Melbourne as part of a strategy to increase its membership in this country.

Earthwatch Australia's managing trustee, Claire Cannon, has noted that a recent survey of 400 business leaders world-wide found that 92 per cent saw the environmental challenge as a central issue for the 21st century. Increasingly, organisations with a poor environmental record will find it difficult to recruit and retain high calibre staff.

Earthwatch sponsors scientific research projects around the world to monitor global change, study endangered species and habitats, and document and preserve cultural and social histories of the peoples of the world.

Through its Earth Corps of paying volunteers, Earthwatch has contributed more than 28,000 volunteers and over \$18 million in funds to 1,085 environmental projects in 87 countries.



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DISPELLING AGE OLD MYTHS

BARRY JONES





Barry Jones is a regular columnist for 21°C, and has recently been elected president of the Australian Labor Party.

aturally, the ageing of our population will have a dramatic effect on retirement. For the first time in human history, retirement has become a definite and significant phase in most people's lives. People who retire today at 55 may normally look forward, at least, to 20 more years of active life.

But these trends will not continue indefinitely. Demographers project that the rise in the number of old people should level off around the middle of next century and the proportion of those over 60 should stabilise at around 25 per cent. Similarly, full employment as we experienced it from 1945 to 1975 will disappear or need radical redefining together with the increasing desire of older employees to continue working.

Typical of the media alarmism about the greying of Australia is an article which appeared in *The Bulletin* (10 September 1991) 'Time Bomb for Baby Boomers'. The article recycled a number of inaccurate or irrelevant figures as well as various cliches, in particular, the fear that population ageing is a time bomb that threatens to blow the economy to pieces.

Two sets of figures compare how commonwealth outlays will not suffer with an ageing population. First, a study in 1988 by the Economic Planning Advisory Council (EPAC) found that if the value of age pensions increased in line with general living standards and the pension take-up remained constant, expenditure on the age pension would increase from 2.8 per cent of GDP in 1985 to 4.5 per cent in 2025. When EPAC considered total social expenditures (health, welfare, education, employment programs and social security), however, it found the increase to be much smaller. Even in the unlikely event of no improvement in labour productivity, EPAC estimated the ratio of social expenditure of GDP would grow from 20 per cent in 1985 to 22.5 per cent in 2025, a figure it considers quite sustainable.

It is clear from these figures that while the Departments of Health, Housing and Community Services and Social Security will need extra funds to maintain their current range and quality of age care services, there is no suggestion that the Australian economy will not be able to supply the necessary increases. Indeed, as the EPAC study shows, this would be possible with a minimal level of economic growth.

he most regrettable feature of some commentaries is the implication that the aged are no more than a burden on the rest of society. Common myths suggest that older people are incapable of learning, unproductive, physically decrepit and dependent on others in daily life. Submissions to the Long Term Strategies Committee have emphasised, on the contrary, that:

- ◆ No differences in learning capacity appears until after 70 years. Dementia (or Alzheimer's disease, formerly known as senility) occurs in fewer that 2 per cent of 65 to 79 year olds and in fewer than 30 per cent of those aged 85 or more.
- ◆ The greatest physical decline occurs between the ages of 30 and 40 years. Reduced activity resulting from illness is not greater after 65 than before, and limiting chronic conditions increases only after 75 years.
- ◆ Illness-related dependency increases only after 75 years. The prevalence of disability is 18 per cent between 65 and 74 years, 43 per cent between 75 and 80 years and 83 per cent for those aged 85 or more. The rate of dependency increases from 2 per cent between 65 and 74 years to 6 per cent between 75 and 84 years, and to 28 per cent at 85 years or more.
- ◆ Contrary to the picture of an old people's home usually brought up when the media mentions the aged, the vast majority of aged people live independently. Only 4 per cent at age 65, and 6 per cent between 75 and 84 years, live in nursing homes.

lder people are not an homogenous group, but have as wide a range of tastes and interests as the rest of the community. It is normal for older (meaning retired) people to lead busy, socially active lives and to be independent, healthy, mentally competent and useful members of society at 80 or even 90 years.

It is clear we need to reappraise drastically our entire attitude to ageing and the aged. We all know about discrimination involving race and sex, but the problem is similar for the aged. Retired people do have a lot to contribute to society and we have to encourage them to do so, not least in employment. Advances in technology and economic prosperity have given us a golden opportunity to live longer and live better. We should grasp that chance and make sure that the elderly – with all their wisdom and experience – play their full part.

THE AUSMAP ATLAS OF AUSTRALIA

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'Finally Australia has an atlas of its own—a state of the art, colourful and vibrant collection of maps and images that reveal the amazing topography and flora and fauna of this country, the nature of our cities and our society. *The AUSMAP Atlas of Australia* is a long-needed addition to the bookshelves of schools and homes around the world.' Susan Oliver, Managing Director, Australia's Commission for the Future

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"The Yellow Lady"
will survive as an
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between national
history and national
geography. The
author's earnestness
of purpose and
sheer hard work are
everywhere evident.'
Robin Gerster,



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the YELLOW LADY

Australian impressions of Asia

Alison Broinowski

The Yellow Lady is the first major critique of Australian impressions of Asia. Alison Broinowski argues that Australians have been backward in developing an appropriate image of themselves because of their ignorance of and ambivalence towards Asians. She traces the history of Australian ideas about Asia and the Pacific from pre-colonial time to the present, and concludes that some of these perceptions, no matter how irrational or archaic, continue to underlie the political and economic decisions Australians make about the Asia-Pacific region.

No one has ever looked so exhaustively at aesthetic responses to Asia.

Alison Broinowski, a long-time diplomat and writer about Asian issues, identifies these images, where they come from, and how they have changed or not changed. She investigates image-makers who took an interest in Asia and why they did so. They include visual artists, novelists, film-makers, composers, architects, poets, potters, playwrights, photographers, puppeteers and choreographers. Japan receives the greatest attention as a continuing source of images of modernity and tradition.





he most comforting aspect of the future is that it is the best vantage point from which to view the past. It probably explains why historians who write of ancient civilisations are more objective than those who write on contemporary history.

When future generations look back at the 20th century's policies on drug use, they will surely wonder why prohibitionists worked so hard to keep traffickers in business.

Standing shoulder to shoulder with those genuinely committed to prohibition for moral, health, religious and personal reasons, are the traffickers. They, too, would hate to see any easing of access to the currently prohibited drugs.

Prohibition is the illicit drug entrepreneur's meal ticket. Prohibition fuels the trade, maintains high prices, brooks no regulated health standards that apply to their consumables.

This century the world has endured a disgusting litany of wars, from the Boer War to the Gulf War, but none has been longer than the "drug war", first declared in 1910.

It is a war the United Nations, the United States, and even Australia cannot win. The 'generals' who run this war have so distorted the strategy that every day we continue current prohibitionists' policies we add to the casualty list.

In any war we need to know: Who is the enemy?; What is our objective?; and, How do we achieve it?

If we examine the current use, possession and traffic in illicit drugs – the battleground – we are told that the enemy are those who traffic in drugs, who push them. We are told it is organised crime, the Mafia, the Hong Kong Triads.

But the reality is that society targets the users, the addicts, the addicted street traders. We attack the sufferers, the victims. We allow the entrepreneurs to go free.

fter almost a century of failure, Australia along with the rest of the international community, is still pursuing the impossible objective of abstinence from currently illegal drugs, complete eradication of illicit drug crops, manufacturing laboratories, courier networks, and selling outlets. According to police and customs evidence to parliament, Australia's 'success rate' in intercepting illicit drug imports is a maximum of 15 per cent: 85 per cent of illicit drugs come in either undetected or with the help of a 'blind eye'.

The objective we should be aiming for – and one that is within our reach – is harm reduction for those dependent on drugs, including alcohol and nicotine.

In turning away from prohibition, three related policy courses are available:

- Tolerance of recreational drugs, with a similar degree of caution now being shown towards alcohol and, even moreso, to tobacco.
- Medical help and counselling for those who wish to beat dependency on a drug. Education and information to alert people to the risks of drug taking, again including alcohol and nicotine.
- Crippling any illicit trade in prohibited drugs through government licensed growers, manufacturers, distributors and retailers.

The massive profits to be made from the illicit trade defy all efforts throughout the world to enforce prohibition. Estimates prepared for the NSW Police show that a kilogram of heroin bought in Hong Kong or Bangkok for \$15,000, sells in Sydney for \$1.2 million. At that rate of profit, shared by several entrepreneurs before it reaches users, the loss of a shipment in a 'drug bust', the arrest of a courier or even their death, merely amounts to another 'overhead' in a business that can

charge whatever the manipulated market can bear. When one considers this massive world-wide traffic in illegal drugs it should come as no surprise that the trade is the third most lucrative in the world, surpassed only by weapons and oil.

Prohibition is the abrogation by governments of any meaningful control of the market.

he costs of Australia's prohibition policies are expensive, according to Dr Robert Marks, of the University of NSW. Drug enforcement costs, such as police and courts, amount to \$320 million; production losses, \$178 million; methadone maintenance costs, \$48 million; value destroyed in property crime, \$165 million; defensive costs against theft, \$230 million. In 1987-88 this totalled \$941 million. Another \$656 million was spent as a result of drug related property crime losses (\$466 million), and social security payments (\$190 million).

In the face of failure, despite increasing anti-drug budgets, and even military mobilisation in some countries, what can be done?

Ironically, the spread of AIDS has changed some attitudes. Australia has taken the courageous, but legally contradictory, step of supplying and exchanging syringes and needles to users in a constructive

move to limit the spread of AIDS. But more has to be done if the illicit trade and the official corruption that allows it, are to be broken.

The initial answer is to provide users with an authority which would allow them to obtain government licensed drugs of a known strength and purity. It is a scheme which has successfully worked for dependent users in the Merseyside region of the UK. Applied

to, say, marijuana it could be adapted for the sale of recreational supplies to those who apply for it, eventually leading to a market controlled in much the same way as alcohol is now sold. Eventually, other drugs could be brought within the ambit of government-regulated supply at prices designed to undermine the black market.

Our society's view of some drugs as dangerous while equally dangerous drugs are seen as relatively harmless, stems from a conditioning that governments will tell us what is best for us. In reality, people tend to be more sensible about what is good or bad for them.

In any case, criminal law is not meant to intrude on personal, private behaviour. We are free to ignore warnings on bottles which tell us they contain poison. We are free to smoke ourselves to death – as, indeed, most smokers eventually do; we are free to sunbake, despite the fact that three times more people die from its long-term, excessive effects than do those who use opiates.

The world has suffered almost a century of misguided drugs policies that have seen the demand rise, supply increase, anti-drug enforcement

budgets skyrocket, and traffickers grow rich beyond belief. It is time for a change.



Ian Mathews, former editor-in-chief of *The Canberra Times*, is co-author, with former Federal Court judge Russell Fox, of *Drugs Policy: Fact, Fiction and the Future*.

Have you thought about the 21st century lately?

We have.

Where will you or your children be living forty years from now? In what kind of house? In what kind of neighbourhood?

There are one and a quarter million more people living in Australia today than there were five years ago. At that rate, our population will grow to more than 30 million over the next four decades.

How and where we house those people will have a major impact on our economy, environment and quality of life.

That's why the Victorian Government is preparing a long-term development framework for the State under the overall title of *Shaping Victoria's Future*.

The first component is A Place to Live, which looks at the way our cities and towns will develop over the next forty years.

A Place to Live has three main aims. It seeks to halt urban sprawl and create more livable communities. It seeks to promote ecologically sustainable development. And it seeks to achieve a better balance of resources and

opportunities between Melbourne and Victoria's country centres.

To achieve those aims we need to take a hard look at the way we presently build our homes and suburbs.

The Victorian cities and towns of the future will be more self-sufficient and less car-dependent. Housing will be built at higher densities closer to services, employment and public transport. This will make it more affordable.

The Victorian Government's Department of Planning and Housing is already providing for the future through its *Smarter Housing*. *Better Living*. program, which puts the principles of *A Place to Live* into action right now.

For copies of *A Place to Live* and more information on the *Smarter Housing*. *Better Living*. program, telephone (03) 628 5294 or write to the Communication Branch, Department of Planning and Housing, 477 Collins Street, Melbourne 3000.



DPH COMM. 1/92

Government of Victoria



2001: A RACE ODYSSEY

ALISON BROINOWSKI



e missed our first opportunity to resolve the matter in 1788. We missed it again in 1888, when mobs rioted against Chinese migration in Sydney and Melbourne. In 1988, when even normally cynical Australians were moved to reflect on national identity, and when many felt that the point Aborigines made was of greater significance than pyrotechnics, tall ship parades, and royal visits, we ducked the national identity issue yet again.

In my visionary 2001, settler Australians and Aboriginal Australians will have agreed, probably tacitly, that they share the country as equals. That we also share the Asia-Pacific hemisphere will be visibly demonstrated by the presence of about 7 per cent of the population as Asian Australians.

In 2001, the kids who are in primary school now will be young adults. They will have grown up with an Asian presence in the customary mainstream of their lives, more of them will speak Asian languages than in any previous generation, and most of them will look back in wonderment on a time when Australians thought of themselves exclusively as Europeans, and indeed looked like it.

But no celebrations should be planned if by 2001 we have not equalised the Western, historical elements of our cultural and educational canon with Eastern, geographical ones. That will require not

only the infiltration of more Asian content into the current educational canon, but also a revisionist search through what we have taught and believed in the past, to acknowledge Asian Australians and to give Australian Asianists of the past their due.

No fireworks or circuses need be ordered unless Australia has gained acceptance in Asian organisations, and as a country not representing the West. Unless Australians have become much more successful as traders, investors, participators and negotiators in Asian societies, we will be as isolated an enclave as South Africa ever was.

The champagne can stay corked if detailed reporting on Asian affairs in the Australian media has not come out of the SBS and RN closets and become familiar, continuous and relevant to a wide Australian audience.

No Australian will have much to smile about in 2001 if, in our films and performance, Asia is still portrayed as exotic or threatening; if Asian Australian actors and directors and script writers are still the exception; and if the twin stereotypes persist of Asian males as sex-mad, inscrutable villains and of Asian females as china dolls or dragon ladies.

No self-congratulation will be called for until Australia's image in the Asia-Pacific region has changed from that of a museum culture established by Anglo-Celtic criminals, and orchestrated by shop stewards and corporate pirates. Let the speech-makers be silent unless we have greatly improved our image abroad by projecting our talents, instead of our faults, and demonstrating that as well as wildlife and golf courses, we have an exportable, sophisticated culture.

To do that, we will also need to change the reality itself, by making Australia a truly tolerant country where talent is respected and difference is welcomed, a country confident in its identity and its destiny.

e cannot celebrate independence in 2001 unless we have it. The British monarchy is a relative pushover. A republic is only a matter of time. It should not be beyond us, either, to devise flags and sporting colours more representative of our distinctiveness as a nation. Tougher for Australians to demonstrate is the will to limit the extent of external control of our news media, of our access to export markets, and of our foreign policy options.

In 2001, the current agreement with the United States covering the defence and intelligence bases in Australia will expire. We will be planning our celebrations of independent sovereignty as we prepare to renegotiate this agreement. The issues are centrally important and we will need the fullest information on them.

Let us have the vision to enter the 21st century knowing and respecting our own strengths, and alert to ways in which we can emulate the achievements of others across a wide range of countries, from Singapore to Sweden. Let us break with the habit of 200 years of

accepting as infallible models the practices of English-speaking inhabitants of the North Atlantic, particularly in areas like education, health, social services, environmental protection, justice, arms proliferation, free trade, and high technology, in which they no longer set an unrivalled example to the world.

Let us set ourselves a goal – the first national objective outside wartime for Australians since they tried to establish the white working man's paradise – of becoming, by 2001, a centre of tolerance and expertise on the affairs of our Asia-Pacific region; a centre of knowledge about living with and not destroying our land, air, water, or each other; and an example of how a society like no other in the world can survive and succeed.

Alison Broinowski's most recent publication is *The Yellow Lady – Australian Impressions of Asia*. She is regional director of the Department of Foreign Affairs and Trade in Melbourne.





ILLUSTRATION: TODD DAVIDSON



DIVINE INVASIONS A LIFE OF PHILIP K DICK

by Lawrence Sutin Paladin, London, 1991

REVIEWED BY RICK SLAUGHTER

hilip K. Dick's life was a long-running tragedy. From the early death of his twin sister and a difficult relationship with his parents to the last of his five marriages, he experienced nearly every variety of human suffering. His view of the world was off-beat, strange, even paranoid. He was bowled over by visions, scared of the Inland Revenue Service, loved and, at times, hated by many people. Yet out of all this he produced works of stunning imagination.

One of the sad ironies of genre fiction is that it inhabits a kind of ghetto which the literati affect to ignore. Throughout his long and productive career, Dick felt this isolation and yearned to be accepted as a mainstream writer. Yet it was only after his death that a stream of unpublished mainstream novels finally saw the light. He is still best known for masterful works of imagination such as The Man in the High Castle (1962), The Martian Timeslip (1964), Ubik (1969), and Valis (1981), as well as for a vast corpus of short stories, now recently re-issued in five volumes. (Yet Dick would have hated the

overblown space hardware on the covers of these books – he was never a writer of space fiction per se.) Some of the short stories, such as Autofac and The Tales of Perky Pat hold up exceptionally well decades later and must be counted among the minor classics of science fiction.

Dick was a complex and driven man. His late successes – particularly the adaptation of Do Androids Dream of Electric Sheep? as the Ridley Scott film Bladerunner – could not compensate for the long and tangled disappointments of his life. So to provide an accurate account of that life was no easy matter. Yet Lawrence Sutin has

achieved that task with skill and restraint. He opens up much of Dick's inner world and shows, as well as anyone could, how the man's experience and inner drives powered his life and his work. A major reason for this depth of insight is that Sutin draws upon the results of the first study of Dick's monumental *Exegesis*, or private journal. A quotation, one of Dick's many attempts at a summary, provides a flavour:

"... one dozen novels & too many stories to count narrate a message of one world obscuring or replacing another (real) one, spurious memories, & hallucinated (irreal) worlds. The message reads "Don't believe what you see; it's an enthralling-& destructive, evil snare. *Under* it is a totally

different world, even placed differently along the linear time axis. & your memories are faked to jibe with the fake world (inner & outer congruency)". (sic) –Divine Invasions, p. 244

The problem of what is real and what is not preoccupied Dick for many years. But these metaphysical uncertainties never drove him over the edge or, it must be said, provided satisfactory solutions. However, in his at-

tempts to resolve the irresolvable, Dick produced some of the best imaginative fiction of his time. He was certainly hell to live with, by turns dependent and yet acutely demanding. But write he certainly could. Dick achieves a sharp-edged realism even in the oddest circumstances. His works are illuminated, and lightened, by a keen sense of ironic humour. While his characters may live at the margins, they resonate with our own inner knowledge. The act of writing clearly provided him with a sense of mastery and integration unattainable in everyday life.

Divine Invasions is thus an excellent title for

the book. It could easily have fallen into one of at least two traps: dry academic criticism or fannish overindulgence. So it is to his credit that Sutin catches the detail of Dick's life and conveys it with sympathy, yet never goes overboard into sentimentality or uncritical admiration.

Divine Invasions comes complete with a fascinating chronological survey and guide to Dick's work, along with the more usual sources and notes. At first sight, the book looks dense. But this is not the case. Anyone who is familiar with Dick's writing, or who enjoys an insight into the nature of the creative life will also enjoy this book. It shows clearly how fiction can not only lay some of the author's own ghosts, but also articulate collective angst, common nightmares, without descending into despair.

Divine Invasions is a book to savour. It obviously provides many insights into specific works and will certainly appeal to all PKD enthusiasts. It sits comfortably alongside Ketterer's masterly opus on Blish: Imprisoned in a Tesseract (1987) and works like Pringle's monograph on J.G. Ballard, Earth is the Alien Planet (1979). As such, it should satisfy both the PKD specialist as well as a general readership.

THE MIND OF GOD THE SCIENTIFIC BASIS FOR A RATIONAL WORLD

by Paul Davies Simon & Schuster, New York, 1992

REVIEWED BY PAUL BROWN

aul Davies' new book, The Mind of God, is subtitled The Scientific Basis for a Rational World. In fact it's an attempt to investigate the necessity for meta-scientific hypotheses that can explain away the holes in reductionist thinking that have grown ever wider over the course of the past century.

Isaac Newton rejected the alchemic sympathies of contemporaries like Goethe and Kircher and established the rational universal model. By the middle of the 19th century scientists believed that they were close to explaining everything. Then the speed of light was discovered to be a constant and the precise clockwork of the mechanical universe began to run down. Werner Heisenberg, with 'uncertainty', and Kurt Gödel, with 'incompleteness', eroded it further and then the information mob dealt it the death blows.

Alan Turing demonstrated that certain numbers were incomputable and Kolmogorov and Chaitin showed that many irrational numbers cannot be expressed in a more compact form than their entire expansion (the number and its minimum description are both infinite — and unknowable). Then Lorenz did the famous meteorological simulations and the field that became known as deterministic Chaos emerged as the dominant postmodern scientific paradigm.

Now, with photo-realistic computer simulation and immersive computer human interfaces (like virtual reality), the boundaries between 'reality' and 'illusion' are finally beginning to dissolve. The problem of physicist Paul Davies and other followers of the reductionist paradigm is that their tightly held rational explanations are

now recognised as nothing more than another belief system no more, nor less valid than those of the flat earth society, Bokononists or creationists. A lot of scientists, including Davies, are clearly uneasy to find their certainties (beliefs) so cruelly undermined.

Davies is sympathetic with the idea of religious commitment. Nevertheless he often applies Occam's razor (don't 'invent' anything that isn't necessary to explain a phenomenon) in order to discount theological theories. He's clearly uneasy with relaxing his 'objective' critical faculties and at one point describes a wonderfully lucid definition of mysticism by Ken Wilber, editor of Quantum Questions (1984), as cryptic. He's nonetheless happy to endorse the counter intuitive litany of quantum mechanics and the bewildering recent work of Stephen Hawking where the universe is held to have had finite origin in time despite having no defined beginning.

One aspect of this particular paradox is what's known as the Planck time, which holds that the laws of physics didn't come into existence until after this time had elapsed following the big bang. Although Planck time is less that one billion, billionths of a second long, it gives physicists a bad time—if the laws of physics didn't exist then what did? Are there laws 'outside' the universe (or before it began) and, if so, what relationship do they hold to metaphysical ideologies?

Inevitably, given the rapid growth of information processing in the past three decades, Davies spends some time assessing the recent computational theories of existence. The computational paradigm is perhaps one of the most interesting fields of contemporary investigation and undermines our notions of reality like no other theory. Ever since the pioneering work of Von Neumann on self-replicating automata, the idea of artificial life has engrossed both scientists and artists alike. Can a computational entity become self aware and operate as an independent intelligence? Or maybe the entire universe is nothing more than a computational construct – a huge simulation programmed by an external 'deity'.

Davies declares his own prejudice in the fourth chapter where he states: "No subject better illustrates the divide between the two cultures – arts and sciences – than mathematics". This is a populist fallacy with too many exceptions (Dürer, Leonardo, Poussin, Seurat, LeWitt, Snelson, for instance) to be taken seriously. Later he proclaims: "It is widely believed among scientists that beauty is a reliable guide to truth". This is an amazing statement considering the demolition job that art and philosophy have dealt to such eugenic 'purist' ideologies over the past half century. It also contradicts the modern Chaotic paradigm of science.

Although the book is an excellent and lucid overview of some of the pertinent themes of 20th century science I was left, as so often with Davies recent publications, asking 'so what?'. I suspect that it is, in fact, more an insight into Davies own personal struggle with a desire for the 'simplicity' of a belief system after a lifetime of frustration

with the problems inherent in rational explanation. Anthony Claire's recent three part series for BBC2-Soul-covers much the same ground but benefits from first person contributions by many of the key commentators (including Davies). Many, like Claire himself,

acknowledge their religious commitment and somehow the result is a more even presentation of the issues.

Nevertheless *The Mind of God* is an intriguing read. Davies, as always, presents the often obscure discoveries of science in a form that is easy to assimilate. Those interested in modern science, the limits of rational enquiry and the relationship to philosophy and theology will find it an entertaining and rewarding book.

CHANGING COURSE

by Stepban Schmidheiny MIT Press, Massachusetts, 1992

REVIEWED BY FRANCIS GREY

his book is a landmark publication that should stand as a classic in the literature on business and the environment.

Stephan Schmidheiny, a Swiss industrialist and billionaire, produced the book in conjunction with the Business Council for Sustainable Development (BCSD). BCSD is composed of 50 leading business people from around the globe, under the auspices of Maurice Strong, Secretary-General for UNCED, to whom Schmidheiny is the business adviser.

Changing Course represents an honest attempt to confront the requirements of what is known in Australia as Ecologically Sustainable Development (ESD), from the perspective of the business community. I know of no such other attempt. The book travels through a series of issues ranging from ESD itself to pricing the environment, energy and the marketplace, capital markets, trade, managing corporate change, innovation, technology transfer, management of renewable resources and ESD in developing economies. Within these broad topic headings innumerable other issues are encountered: zero pollution; the role of 'stakeholders' i.e. the community, customers, suppliers; the 'balance' between environment and development. The book also provides case studies that align with each chapter, together with addresses for further information.

In effect, it has laid out a short course enabling business managers, and others, to grasp the implications of ESD. The book will spark controversy from both sides of the environmental divide.

Its most striking fault is a political, technological and economic naivety in its constant reiteration of free markets, self-regulation and the ability of business to deliver, seemingly without any role for government. It is a naivety of omission, however, since the enthusiasm of the authors has led them to concentrate on what business could do, if they wanted to, and market trends indicate they must.

The role of government in providing the framework for market activity is noted, but its significance to ESD is not explored. Without strong government direction for industry's use of the environment there is no context for the market to drive the 'change in course'. Changes will be ad hoc, random and directionless unless government lays out clear rules for the use of the 'commons'. The book fails to point out the significance of this issue, particularly since it is business lobby groups that are often hampering the implementation of this framework.

Schmidheiny suggests, accurately, that self-regulation, is the cheapest option. But he forgets Adam Smith's dictum that cabals of business people tend to cost consumers, and the natural tendency of the invisible hand is to eventually break up such groupings. Simply, self-regulation is a contradiction in terms, and has a tendency to undermine environmental objectives. The book should have advocated that business request government to develop a set of consistent and clear rules of the 'commons' that would drive the change in course, for everyone, simultaneously.

Part of its positive contribution in narrowing the gap between environmentalists and business is its advocacy of policies such as least-cost planning and small carbon taxes. It contains a sophisticated and articulate dismissal of the concept of a 'trade-off' between environment and industry, which has immobilised the debate in a morass of misunderstanding and polemic. There is also a useful analysis of the 'It can't be done syndrome'. The advocacy of community involvement and 'stakeholders' further demonstrates an understanding of the requirements of ESD, which is refreshing in a business publication. Thorough discussion of 'technology cooperation' provides some useful, original insights into solutions to the problem of technology transfer between developed and developing nations. The honesty of its admission that the BCSD had not been able to develop an understanding of the role of capital markets, points to future work, while giving the publication credibility. Finally its constant reference to the economic and business benefits and opportunities of ESD should fire any organisation, with an ounce of entrepreneurial flair, to start the process now.

Changing Course is the advanced philosophical agenda for ESD with some hints at practical implications and policies. It cries out for a reply from the environmental movement, or else it will fill the vacuum and seize the agenda of industry-environment policy.

This book is accessible, compulsory reading for anyone with pretensions to understand how we must change the relationship between industry and the environment.

he late English writer Bruce Chatwin thought that human kind is a naturally nomadic species, that putting down roots and staying in one place is aberrant behaviour. Chatwin was a romantic.

In fact, people are so interested in staying put that they are willing to travel great distances in order to find a safe place where they can then create a sense of security in their lives.

We live in a world which combines vast disparities of wealth between North and South and unstable, conflict-ridden, political systems with advanced communications and transport systems. Consequently international migration flows are larger and more rapid than at any other time in human history. Yet until the nation-state withers away, this relentless search for security will create a myriad of problems for the world's governments.

The airport lounges of the world are full of refugees perpetually in transit. In 1989 the scale of illegal East German immigration to the West led directly to the fall of the Berlin Wall. Recently, over 50 illegal Asian immigrants landed by boat on the far north coast of Australia. Yet if planned and controlled, immigration can be of great benefit to individual countries, and the world in general. The history of Australia's post-war immigration policy is a case in point.

From the Snowy Mountains Scheme to its cosmopolitan cities, Australia has reaped enormous rewards from immigration since the end of World War II; it has a larger, younger, better-trained workforce; it has a lively and culturally diverse community; and it is less of an Anglo-Celtic outpost in Asia.

However, the economic certainties of the post-war era are receding under the effect of the current recession and we are witnessing the creation of a new immigration agenda. According to a recent National Population Council report: "the green light for large scale Australian immigration has turned amber, though not red". Indeed, it is expected that next year's estimated intake of 118,000 will be substantially cut by the Federal Government.

In the short-term, debate revolves around the question of numbers. With over 10 per cent unemployment, is the Government being responsible if it maintains present intake levels? The arguments in favour of cutting immigration because we are in the midst of recession are usually politically expedient. The public will construe any reduction of immigration levels as a plus for employment opportunities. Yet by its very nature immigration policy is not a short-term policy option. It cannot be turned off and on like a tap. The bigger, more important debates centre on long-term issues. It is these types which will mould the size and nature of Australia's immigration flows in the future.

Australia's population is one of the fastest growing of any country in the OECD. If current annual intakes of immigrants are maintained at present levels, Australia's population will reach 25 million by the year 2031. Will these millions of Australians be well educated, well housed, and comfortable with Australia's place in Asia?

The major immigration issues of the future can be summarised under three Government catch-phrases: "Australia as the clever country", "better cities" and "Australia is part of Asia".

THE CLEVER COUNTRY

The Australian economy has always suffered from skills' shortages in certain sectors. Immigration has been traditionally used to overcome these bottle-necks. Yet, matching demand in the labour market with supplies of suitably qualified immigrants is extremely difficult. Time lags, changing economic circumstances and the humanitarian com-

ponent of Australia's immigration policies all conspire to deform policy goals in this area. Unfortunately, bureaucracy often accentuates the affect of these problems. A report prepared by the NSW Ethnic Communities Council found that the Department of Education has been recruiting staff overseas while 1,000 foreign-trained languish on the dole waiting for their qualifications to be recognised. If a Department of Education cannot 'think smarter', what hope is there for the ideal of the "clever country"?

Given current trends towards reducing immigration, should skilled migrants take precedence over refugees and family reunion migrants? Is there any way of balancing these conflicting tendencies? In order to become a "clever country", must Australia become a "cruel country"?

BETTER CITIES

In February, the Bureau of Immigration Research released a report on internal migration in Australia. It discovered that if present trends continue, over the next two or three decades a "Moreton Metropolis" would be created on the Queensland-New South Wales border stretching for hundreds of kilometres along the eastern seaboard. At the same time, the report found little evidence that the inner cities of Melbourne and Sydney have been rejuvenated and repopulated.

At a time when the Government feels compelled to follow market sentiment and restrict expenditures, can Australia even develop the infrastructure needed to support the growing urban sprawl of its cities? And if it cannot, should the Government either reduce the migrant intake or compel new arrivals to take up residence in allocated regions?

PART OF ASIA

Since the publication of the Garnaut Report in 1989 this phrase has entered the vocabulary of Australian political debate as a convenient 'sound bite'. But what does it mean?

Humphrey McQueen recently argued: Australia is not part of Asia. The reiteration of the claim that "Australia is part of Asia" indicates how far off that incorporation remains. Obviously, Australia will not become "part of Asia" by merely repeating the phrase like a mantra. Real, fundamental and difficult changes have to occur in a variety of policy agendas, including immigration.

During the September quarter of 1991, immigrants from Hong Kong outnumbered those from Britain for the first time since statistics began to be collected. People from Hong Kong made up 14.4 per cent of the quarter's total intake, compared with 13.1 per cent from Britain.

Is this a good or bad thing? The Garnaut Report is famous for pointing out that Australia's economic future is greatly dependent upon the Newly Industrialised Countries (NICs) and Japan. Hong Kong is one of these vital north-east Asian economies. Is it time for an Australian Government to grasp the nettle and actually encourage Asian immigration?

As Gavan McCormack has pointed out: Australia must strive to achieve closer integration with the economics of its region on terms which allow for its profile to be gradually changed from that of supplier of raw materials and holiday destinations to that of an industrial or post-industrial society.

Can this only be achieved by taking less migrants, all skilled and well educated and exclusively from our own region? And if it is not achieved will young Australians find themselves 'going North' in search of economic security come the next century?

Brett Evans is a research officer with The Evatt Foundation

Much left undone

t was a question of courage. Do the northern, industrial and wealthy countries tell their populace to make an adjustment in living standards (in a voting year), or do they make concessions to business and industry interests that

environmental gains will be made – but in line with the economic advantage business can make of it all?

To a large extent, that was what George Bush, and in turn, Paul Keating, albeit by proxy, told the rest of the

THE BOTTOM LINE

US, sought a structure to reduce CO₂ emissions with specific deadlines. What they ended up with was a convention sans timetable and targets which was signed by all participating nations except Malaysia.

ON BIO-DIVERSITY UNCED hoped for a hard-hitting convention to save plant and animal species. The result was a far weaker convention which the US refused to sign.

on Funding UNCED estimates stated \$US125 billion a year until 2000 would be required from developed nations to instigate and maintain a global 'clean-up'. The result was a pledge from Japan of \$US7.7 billion over five years and from the EC of \$US4 billion over an unspecified time.

planet during the recently concluded Earth Summit.

The Summit was never likely to be an all out success, however, in the autopsy performed by Malaysian Prime Minister Mahathir, it was a case of, "the North must show by example".

It isn't difficult, looking upon Australia's Rio performance, to feel that this country has swapped ideals for political power playing and certainty for trepidation.

It was not alone. Like the US, lobbying by big business and the electoral insecurity felt by some leaders led to a

distinct limiting of the ambitions of The Earth Summit. It must be said, that the short-term ambitions of these governments have helped undermine the longer term goals of the organisers of the conference.

Of course, George Bush was well prepared. He stated: "We are the leaders, not the followers". However a sceptic may ask, leaders in what? – given that most statistics released during UNCED proved that the US was most decidedly a leader in pollution.

"We have sound environmental practices," he pronounced, but managed to omit that the US, with only 5 per cent of the world's population, generates 25 per cent of the world energy emissions, 22 per cent of all carbon dioxide (CO₂) produced, and accounts for 25 per cent of the world's gross national product.

More than 100
world leaders
and 30,000 other
participants met
for The Earth
Summit in Rio
during June.
The ambitions
were high, but
most remained
unmet.



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Few countries could claim The Earth Summit as a public relations success. Much of Asia was left being blamed, but made it clear to all that they could see no reason why they should pay for the sins of the developed nations by destroying their own economies.

This is made all the more stark by the self-imposed commitments undertaken by the European Community – with its ambitious target of cutting CO₂ emissions by 25-30 per cent by 2005. A proposal that was blunted by the demands of the US to avoid specific targets and deadlines, a move which led to a veto of Rio by the EC's environmental delegate.

A strange mixture of heroes and villains arose from the event. Malaysia's Prime Minister Mahathir came across as pragmatic and well informed.

Japan, high on the scale of world polluters, seemed willing to acknowledge its guilt and recognise that a change in lifestyle will be the only answer, a remarkable admission from one of the world's greatest consumers.

Japan and Europe stood out as the most enthusiastic supporters of the bid to reduce

greenhouse gases, although ironically, Japan, while keen to reduce CO_2 emissions, will battle for the reduction by introducing what many consider an equally worrisome element into the human environment – nuclear power.

With a government beseiged by pressure groups, a decidedly uncertain bottom-line policy and a prime minister more concerned with his own future than the world's, Australia was left in an intriguing, and none too praiseworthy position.

Floating between the North-South divide, Australia was originally widely mooted as a potential mediator in the often heated debate that flared between the developing nations and the rich West. It was an opportunity that Australia's key representative, environment minister Ros Kelly, failed to capitalise on – and one which Greenpeace Australia considered a wasted opportunity, according to spokesperson Beth Powell. This was, she believes, one of the major problems with UNCED, "no one took the lead".

Perhaps inevitably, Greenpeace has strongly objected to Australia succumbing to the business lobby groups.

Events of 1972 – during which a not dissimilar, although smaller, forum was held in Stockholm – "set the tone for the next 20 years and there is now an acceptance that environmental problems are serious," Powell said. "This conference was probably too big and no one seized the opportunity to take the leadership. Australia could have filled that role."

Chris Burnup, assistant director of the Business Council of Australia, agrees that the agenda was ambitious. "No one should

fool themselves," she said. "This is going to take awhile. Agenda 21 was 700 pages long. How can you cope with that in two weeks?

"Every country," Burnup added, "has its agenda, but when people go home and find out what it means to them [they'll realise] that it is a myth that things haven't been happening [in Rio]." As she points out, it will take some time for the dust to settle and the real results from Rio to be felt.

There can be little doubt that the Australian business community held far more sway in Australia's policy preparations for Rio than any of the environmental organisations.

"One of the greatest tragedies," Powell said, "is that the G-77 (developing) countries wanted a ban on import/export of toxic wastes and dumping and this was blocked. And this was in the negotiation stage!"

Few countries could claim The Earth Summit as a public relations success. Much of Asia was left being blamed, but made it clear to all that they could see no reason why they should pay for the sins of the other nations by destroying their own economy. Most developing nations ignored any recommendations which came without guarantees of aid to buy the energy efficient equipment and transfer of technology to support environmental management and clean-up they were all talking about. It seems that most of the principles laid out in New York on 1 May, for discussion in Rio, and summarised in the Australian Department of Foreign Affairs and Trade agenda, were forfeited at Rio.

"All States co-operating," as outlined by the agreement, became every country for themselves. "Eradicating poverty", point 5 on the agenda, became we will not forfeit our own way of life for someone else's. The next topic on the agenda, the vulnerability of developing countries being given priority, was obviously discarded. So the compromises continued.

Before she left for Rio, Australia's representative, Ros Kelly, proffered the pragmatic question on greenhouse gases: What if the scientific worse case scenarios are correct? "It's not a matter of waiting to be more certain," Ms Kelly argued, "but the consequences of putting off action while we wait."

Regardless of the outcome – a mixture of disappointment and hope – the UNCED conference in Rio was the biggest global event in mankind's history to acknowledge that we live on the one planet: a responsibility which needs to be shared.

One of the more optimistic results was the establishment of the UN Sustainable Development Commission. This body, closely based on the Human Rights Commission, will allow public criticism to hold governments accountable to Rio's agenda. The body will come into effect later this year.

While this is being enacted Maurice Strong and Greenpeace agree that it is up to the world's population to force politicans to honour the requirements that according to the Rio agenda are needed to save the planet.

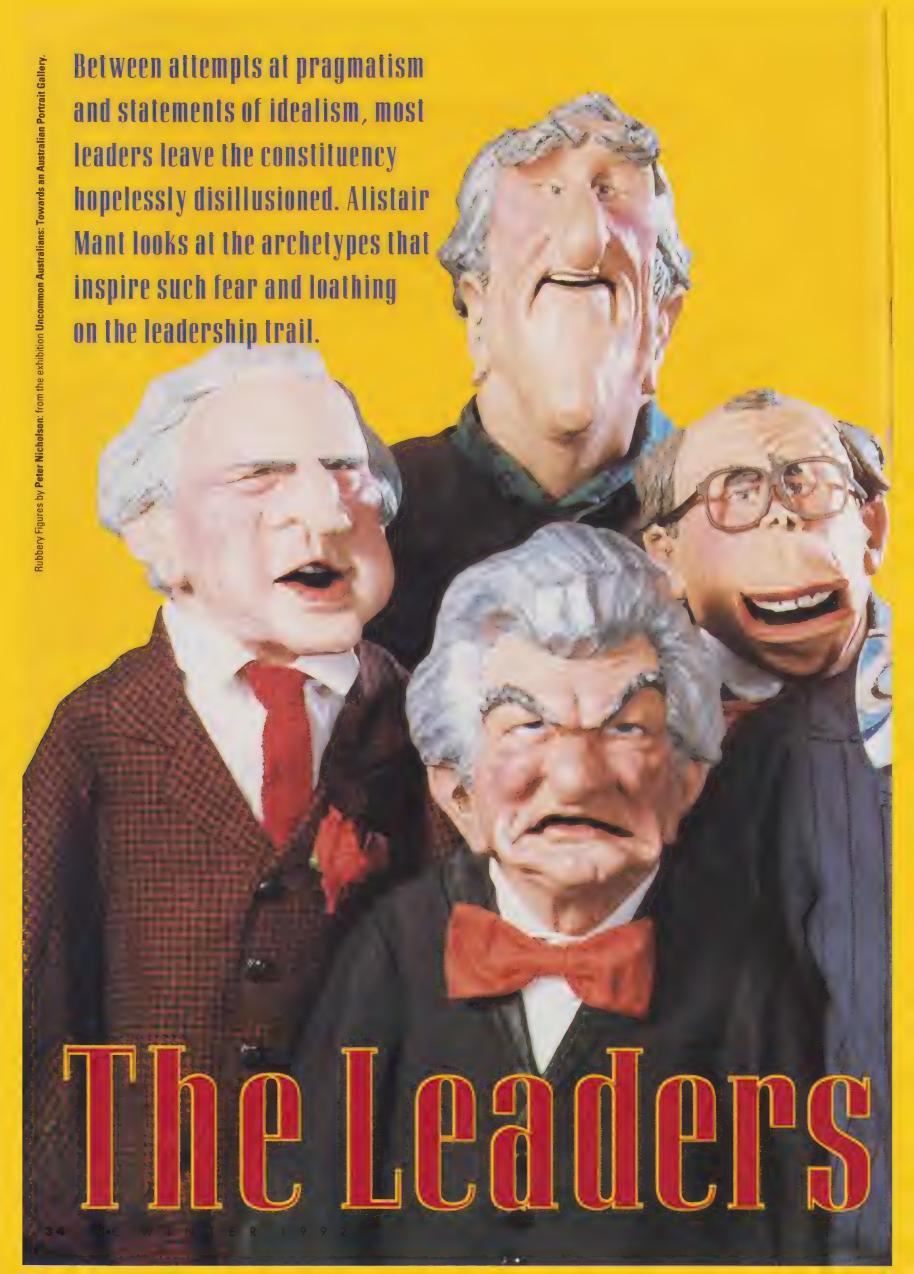
And judging by the more 300,000 pledges sent by children from around the world, and exhibited next to the Tree of Life during Rio, there is already a large and youthful pressure group to maintain those aims.



these posters will remain with all those who see them.

W I N T E R 1 9 9 2 21 C

KEN CATO



ustralia is a mess. That's the bad news. But it is a similar kind of mess to a number of other relat-ively affluent countries which have run out of ideas about what to do next. When this happens, in our kind of culture at any rate,

particular kind of leader to show a way out of the mess. The Germans, for example, went from needing leadership to yearning for a leader towards the end of the 1920s. Australians, thanks to the tall poppy reflex, are unlikely ever to make the shift to idolatry, no matter how bad things get. They could get much worse, however. J.K. Galbraith once remarked that the Swiss, on being faced with a serious problem, tend

with solving this". In Galbraith's view the Anglo-Saxons tend to say: "Let's find someone to sort this out for us". At the time, he was referring to the unique system which divides Switzerland up into coherent and highly participative provincial political units. In Switzerland, you



he UK is also a mess, mainly because of the implausibility of effective administration of more than 50 million people from one political centre. Scotland, however, is coherent, just like each of the Scandinavian countries. If you meet the people who really matter in Edinburgh, or Stockholm, they can put you in immediate touch with all the other people who call the shots. Jan Morris' new book, *Sydney*, makes the same point about another city-state; you can get to know everyhody who matters in Sydney pretty quickly, if you start in the right place, but it won't tell you anything about Melbourne.

Hudson at the helm: lessons in leadership.

But, I am jumping ahead. What credentials do I have for sounding forth about leadership in Australia, apart from being born in the country and clinging to an Australian passport? My answer would be that I have spent nearly 30 years watching how leaders and followers find each other in a world complicated by the distortions of spin-doctors. Most of that time, I have marvelled at the way that sensible task-oriented behaviour is shot through with apparent irrationality when it comes to leading and following. I have learned that if you deal with the leadership issue purely in terms of rationality, you quickly lose your bearings. Leaders who are able simultaneously to engage the minds and the viscera of their followers are rare.

One such as Sir William Hudson, whom I blame for seriously misleading me as to the nature of leadership in large complex organisations. At the age of 19, I got myself engaged

as a humble fitter's assistant on the Snowy Mountains Scheme. The motivation, apart from a lot of money, was mainly macho; I fancied myself as the rugged, pioneer type, hewing great dams and power stations out of the granite. The point

Sir William Hudson was Commissioner for the huge Snowy Mountains Scheme... humble and brilliant, he would have made a good PM.

about the Snowy was that the organisation and practices were, for the most part, entirely sensible, because Hudson, the original Commissioner for the Scheme, insisted on them.

For example, each engineer on the job was obliged to talk all the staff, however lowly, through the progress flow-charts on a regular basis. This was made more difficult by the fact that hardly anybody spoke English (so the pictorial representation mattered) but easier because the whole scheme, though huge, was about as complicated as a domestic central heating system. Hudson simply knew, because he was humble as well as brilliant, that ordinary people need coherence in their work; they need to understand why it is done and what is its value. It took me nearly 20 years to understand how unusual Hudson was. He would have made an excellent prime minister.

At its height, the Snowy Mountains Scheme was like a

city-state in its own right. It had its faults, of course, but it showed what Australians can do, in collaboration with other cultures, when the task is clear and valuable and the leadership combines high intellect with determination and humility. If I have any credentials for writing about Australian leadership, I think they were forged then, when I saw what was possible. The word 'vision' is over-used these days but most of those who worked on the Snowy are still aware that they participated in something rather special. Hudson, by the way, was a New Zealander and came to the top job at the ripe age of 53, by which time he had accumulated some wisdom.

But can you view an entire country in the same way as a major civil engineering project? Why not? Big schemes like the Snowy have a project life of nearly 50 years; big countries (like the UK, for example) typically run on the average politician's time span (years to re-election, minus one). Short-termism has become the bane of the Western democracies and very few countries (Japan, the Scandinavians again) have succeeded in harnessing democratic government to institutions which are able to drive forward long-term change both at home and (in collaboration) abroad. Where it is achieved (Japan again), it may be at the dangerous cost of virtually one-party government.

Watch out Australia!

We do know that the right leadership for Australia in the future will be a reflection of the will of the people and the unhappy realities of the economic and industrial infrastructure. How would a professional management consultant

approach the task of setting the country to rights? First, he or she would need to avoid two common pitfalls:

(1) dealing with the system as if it were either an economic/technical machine or merely a social system. Most consultants specialise in one or the other; very few seem to be able to work simultaneously with the whole 'socio-technical' organism. Most of the management consultants pouring into the former Soviet Union now

are tinkering with the economic system and failing to recognise that 70 years of state communism has rendered the people bone lazy. You can't make Western economic systems work without elbow grease. Hard work is a social custom; it takes generations to alter such customs. On the Snowy, Australians appeared to be a hard-working race.

Margaret Thatcher (a chemist by training) adopted the machine view of Britain, pursuing just one (monetarist) economic strategy for change, based on just one social assumption (that 'competition' will do the job of adjusting the state for you). It meant, unfortunately, ignoring just about everything important that others were learning from Japan, especially about the value of harmony and the usefulness of collaboration. The true cost for the UK of that overly simple view has yet to show through. The recent British



general election made it fairly clear that, although the government rhetoric for 10 years past has been about freeing up and empowering the little people, the net result has been a broad increase in fearfulness and insecurity. Watch out Australia! Yet, unaccountably, other countries followed Mrs Thatcher's lead. What on earth were Australia and New Zealand up to in so slavishly buying the whole bill of goods (rather than the few elements of common sense which might have applied outside the UK)?

(2) dealing with the system in terms of the future ('strategy') or in terms of its present constitution. The most successful consultancies in the world are the 'strategy boutiques' who wax fat by fantasising with their clients about pleasanter matters than the messy present. No long-term plan ever came to fruition but nobody is going to pay a fortune to be reminded of that. The national equivalent is the 'think tank', a collection of egg-heads who explore possible futures and, if they are really clever, try to work out if the body corporate has the physique or the musculature to begin to move towards achievement of any of them. Most consultants just deliver the recommendations, pocket the cheque, and move on to the next fantasy.

The right approach to strategising is quick and repeated oscillation between the sunlit uplands of fantasy and the horrible peculiarities of the system as it currently exists. The social peculiarities were set out in stark detail by Barry Jones in $21 \cdot C$ issue three. They included:

- the provincialism and complacency of Australian culture
- the short-termism of thought and decisions
- the "cultural cringe" of unclear identity
- the decline of (real, democratic) politics
- materialism and the decline of fairness
- the envy of cleverness

Of these, the last is perhaps the most damaging, inextricably linked with the second last. Envy feeds on unfairness. If the Holocaust is the dominant event of our century, we should remember that it required the burning of books for its initial combustion.

It follows from all this that the helpful consultant to a country like Australia would attend simultaneously to the technical (e.g. economic) and the social (human) aspects, as well as to both the future ideal and the capacity of the messy present to heave itself in a sensible direction. It's a tall order and it requires the cleverest people around, not just in the 'intellectual' sense but in terms of animal cunning too. That brings us back to leadership.

Idealism versus narcissism.

At this point the consultant recognises that, like it or not, the client has certain ingrained habits when it comes to leadership, difficult, if not impossible, to break. These habits are determined by culture. One need look no further than the remarkable, sympathetic, rhythm of national leadership types in the post-war Anglo-Saxon nations. After the initial reconstruction, the people of Australia, the UK and the USA



Harold Wilson on the campaign trail.

The winds of change blew, as they must, and Whitlam, Wilson and Kennedy rode into power on the idealism of the young.

apparently 'decided' on the dependent model of leadership, settling for three reassuring old buffers (Menzies, Macmillan and Eisenhower) none of whom did anything to drive forward the more fundamental task of socio-technical reconstruction which was needed. Sadly, industrial 'leadership' simply followed this complacent example.

In the end, the winds of change blew, as they must, and Whitlam, Wilson and Kennedy rode into power on the idealism of the young. The defining personal characteristic of these three leaders was their wit. In fact, they, along with Pierre Trudeau, are probably the last genuinely funny national leaders we are likely to see in Anglo-Saxon culture. Graham Little of the University of Melbourne has written brilliantly about the "pairing" model of leadership symbolised by these three men. The psychology of pairing is about hope and therefore about the future. This kind of leadership provides a strong sense of community and sharing. Unfortunately, these high ideals commonly co-exist with a combination of personal vanity and political naivety. Generous in spirit,

such leaders often fail to protect their backs and get drawn, with the purest of motives, into shady company. Even Kennedy, had he lived, is unlikely to have surmounted the steady build-up of gossip.

When the pairing type of leader falls (or, usually, is pushed) people are left feeling as though they too had a hand in the cookie jar, so strong is the sense of personal bonding with the leader. The natural response of a Whitlam under threat is to amplify the personal bond with each follower by the injunction to maintain the sense of shared outrage. A wiser move might have been a reversion to dependency. The accounts of what exactly happened on November

11th, 1975 are garbled but, probably, if
Gough Whitlam had simply telephoned the Queen with the news that
one old bruiser from the Sydney bar
(the Governor General), propped up by
another (the Chief Justice), was trying
to subvert democracy, she would have
responded swiftly and effectively, as is
her wont. But the pairing leader was in
communion with his people, not with the
tiny lady with the corgis in London with real
access to dependable authority.

After the excitement of pairing comes the cold douche of "fight/flight" leadership, exem-

plified by authoritarians. Fraser, Thatcher and Reagan are the archetypes. They are required to be the opposite of the pairing leader – tough, uncompromising, competitive and constantly on the alert to threat. The sense of personal closeness disappears. The collapse of the Soviet Union will be problematic for Western fight/flight leaders, until a satisfactory replacement bogey is in place. The world of Islam is the front-runner, though it is possible that the entire Third World might take on the role if it renegs on all its debts to Western banks.

I will draw a veil over the present crop of relatively colourless leaders in these three countries. And once the technology of mass communication becomes as developed as it is now, the element of surprise may disappear from political party machines altogether. Still, we must remember Gore Vidal, one of the shrewdest observers of American politics, has his money on Schwarzenegger and/or Schwartzkopf for 1996. It was Vidal who had the wit to see that, in Reagan, the Americans had not so much elected a president as persuaded an old actor to impersonate a president. Where the American spin-doctors go, there may we follow.

The point about these orientations – dependent, fight/flight and pairing, is that they are all rooted in some kind of reality. We do need to depend on something reliable, we do also need to battle with various real enemies and we do need also the sense of closeness and community. Margaret Thatcher was a great fight leader; her mistake was to deny the existence of 'society'. Bob Hawke was a creature of consensus, like all narcissistic leaders, but ducked some of the unpopular but necessary fights. We yearn for leaders who can respond realistically to each need; we get, for the most part, leaders who can play only one tune. That is what political party machines are equipped to deliver.

When things turn nasty.

cyclical shifts over time in the pattern of leadership are often found amongst company chairmen and chief executives, although the time cycle is generally shorter. The issue is complicated by the operation of what I call the Merchant Marine Model of leadership, based on the necessity for a bastard (fight/flight) chief executive (the first mate who gets things done) together with a lovable (dependable) 'old man' as the chairman who symbolises gentler, longer-term values. Whitlam's mistake was to forget that the dependent/symbolic figure (the Queen) is constitutionally placed to turn quite nasty, if required.

The consultant to industry and business is aware that these

The tough chairman/kindly chief executive combination is generally less successful but it can be made to work. British Airways currently works

Douglas Jardine – a good example of the dangers of aggrandising all power in one person.

very well this way but it is inherently a less stable arrangement. As my father is currently completing the definitive book on the infamous "bodyline" cricket tour of 1932-1933, I offer the example of the notoriously authoritarian English captain Douglas Jardine who regarded all Australians as mortal enemies (because they always poked fun at him). Jardine provided a good example of the dangers of aggrandising all power (chairman and CEO) in one person. His vice-captain kept peace with the team and the ineffectual tour manager failed utterly in the impossible task of keeping peace with the world at large. Those who can combine the two roles successfully are very rare indeed.

What can be done to ameliorate the effects of all these

The Americans had not so much elected a president as they had persuaded an old actor to impersonate a president - core vidal.

natural and unnatural processes? For a start, it is not so difficult to examine and, if necessary, test to destruction the constitutional structures of any institution. The problem often is that senior executives don't see things in constitutional terms at all. Too many executives live entirely in a world of political power-broking. Power is important but it needs to be channelled in ways that help the enterprise and which avoid gross unfairness. The highly prestigious Jackson Committee said as much about Australian business in the 1970s but very few people really seemed to understand what was being said. One of the great inheritances of British history is the respect for fairness. The constitutional models that work are surprisingly simple because they flow from our history. The Germans, the Scandinavians and the Japanese have demonstrated that each enterprise, like the state, needs an executive (the management) to make decisions and get things done, a legislature (the "works council" in Germany) to give everybody a stake, through representation, in policy formulation, and a judiciary (some kind of independent process of appeal against executive unfairness or arrogance).

The principles are extremely simple and they always work in practice because they are built on the needs which arise from human nature. The Anglo-Saxons taught these principles to much of the world so you might think they would lead the world in their application in industry. No so. The reasons for this are complex, but fairly high on the list must be the anti-intellectualism referred to by Barry Jones; the failure to grapple with the ideas. There is an additional difficulty, common to all male-dominated systems. The Canadian sociologist Lionel Tiger set this out in his book *Men in Groups* which explains how groups of males, from football hooligans to company takeover raiders, lose connection with their wits when their collective blood is up.

American business is the most extreme example but there are still plenty of Australians and Englishmen who think that America is the great teacher about business.

Fairness in the future.

The '90s is shaping up as the decade when fairness forced its way back onto the agenda, at every level of society and in every part of the world. Any organisation with a cabal of greedy and unaccountable men at the top has relinquished true leadership. If the system doesn't feel fair all the way down the line, the energy will not flow or, if it does, it will flow in the wrong

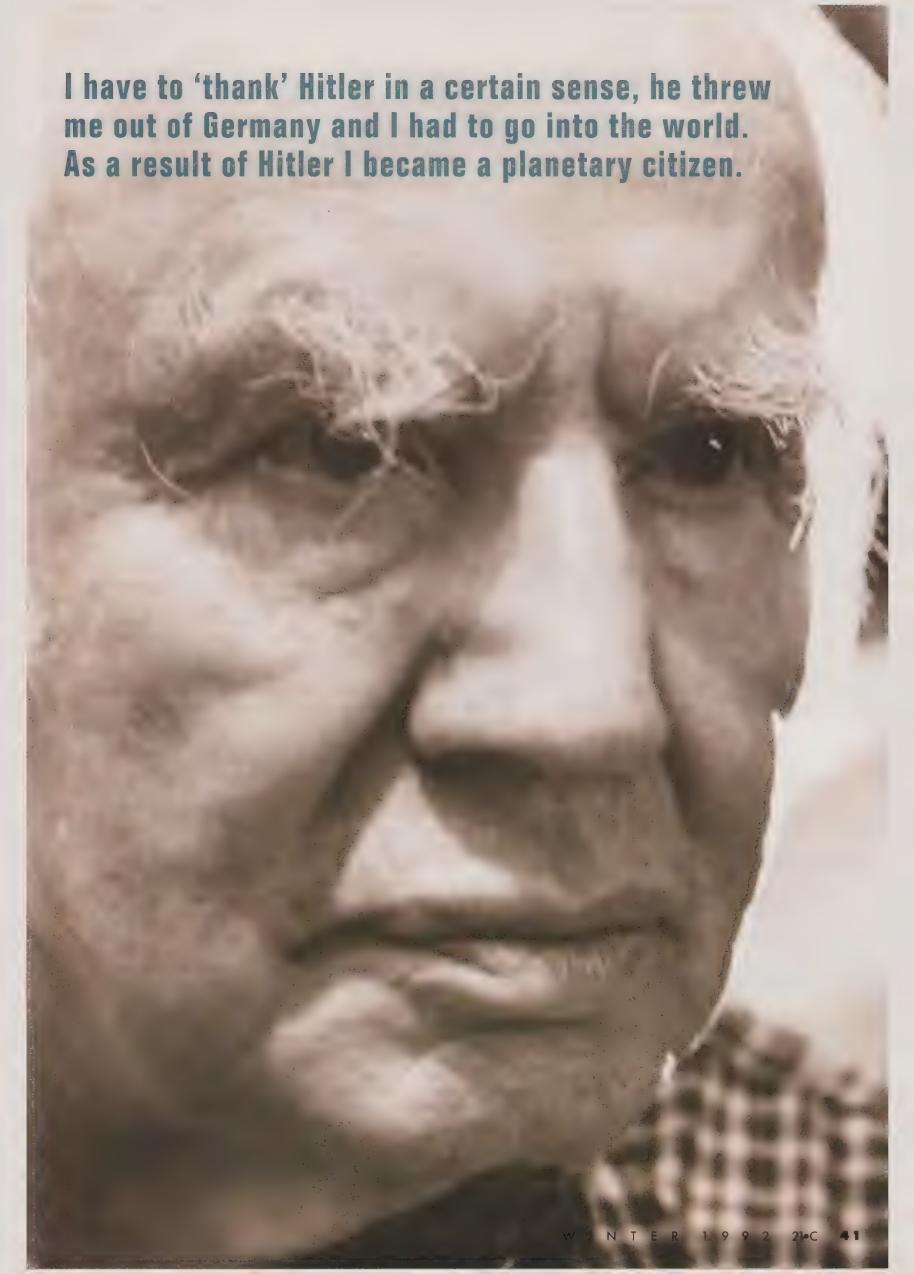
direction. But you can't just order people to behave better, you have to think through, argue about and install new structures and processes which make bad behaviour difficult or dangerous.

Let us close, as we opened, with the prophet Galbraith. He reminds us that, in the past 200 years, no true democracy has ever started a war. But democracy, as he points out, is a function of wealth - the democratic ideal withers in poverty. Poverty then is the greater danger; extreme poverty amongst our international neighbours and relative poverty in our own back yard. The issue therefore is fairness. Whatever 'leadership' meant in the past, it is going to be about fairness as well in the future. That is not idealism but a matter of hard, pragmatic survival; it's an excellent way of making more money. Australia may be in a mess, but its underlying values (mateship, sympathy for the underdog) are sound. The Snowy scheme showed what can happen when attention is focussed on something of widely accepted value. What is that something today?
Alistair Mant is an international authority on leadership. His most recent book is Leaders We Deserve.



ROBERTUUMGK

Rick Slaughter talks to one of the founding fathers of futures studies, Robert Jungk, a major figure in the bid to confront the human and social implications of modern technology.



hen Hitler came to power in 1933 Robert Jungk was a 19 year old Jewish student in Berlin. That year, following the Reichstag fire, Jungk was arrest-

ed for anti-Nazi activities and deprived of his citizenship. With luck and the help of friends he was released, went to the Sorbonne in Paris, but later returned illegally to Germany to work for a subversive press-service. Before long he was forced to flee to Czechoslovakia. The fall of Prague took him to Paris and the fall of Paris to Switzerland. Even there he was jailed for his outspoken condemnation of the Nazis. After the war he returned to Germany, and travelled widely.

From that time on, Jungk set his hand against oppression in all its forms. By 1952 he completed *Tomorrow is Already Here*, a book highly critical of the emerging uses of advanced technology in America. But the focus of his subsequent work turned upon a trip to Hiroshima in the early '50s. It was here that the major themes of his life's work were forcefully impressed upon him: the power and potential destructiveness of modern technologies, the corresponding need for careful foresight and the constant struggle to preserve human dignity in the brave new post-war world.

Why interview Jungk now? Well, after nearly eight decades he has a long view back over the 20th century and has been close to many of its momentous events. From his rich experience emerges a sense of perspective that tells us much about the deep trends, the way things are going. Secondly, his critique is matched only by his constant inventiveness and dedication to people. Such themes are of immense value in the closing decade of the 20th century. Finally, if Australia is to see a way ahead, it will need to listen to voices such as this one. Jungk, and others like him, do not attempt to predict the future. They know it is created by constantly asking the right questions and helping people to make careful, long-term, choices.

Jungk's work falls into three broad phases. First is his painstaking research on nuclear issues, both military and civil, emerging in books like *Brighter Than a Thousand Suns* and *The Nuclear State*. There followed a period spent looking for, and developing, ways of responding to the challenge. This produced *The Everyman*

Project and, much later, *Futures Workshops*. During this time he was one of the founders of the World Futures Studies Federation. He was instrumental in creating the London-based Institute for Social Inventions, now a well-established seedbed for innovative ideas.

ore recently Jungk has become something of an elder statesman in the futures field, and an inspiration both to fellow futurists and to a broader European public. So much so that this year he stood as independent candidate in the Austrian presidential elections. However this was not nearly as successful as his ability to persuade the city of Salzburg in Austria, in the late '80s, to support the establishment of the Robert Jungk International Futures Library. Here, in elegant rooms overlooking the fast, grey river that bisects Salzburg, he has founded one of the great repositories of futures material in the world.

It was Jungk who recognised the need for institutions of foresight in the '70s. He was amongst the first to draw attention to the important distinctions between what he called "the logical, critical and creative imagination" in futures work. He has done more than most to identify the central dangers of this most dangerous of centuries. But he has not merely diagnosed, become angry, nor railed helplessly against vast and impersonal forces. Instead he has pursued a wide variety of individual, institutional and community responses, and not without success. It's therefore no exaggeration to think of him as a kind of 'one-man revolution', albeit a wholly benign one. As such, he exem-

plifies a central principle of futures work: Don't wait for the future to happen; look ahead, evaluate what you see, and act now from the highest motives you can muster.

Now nearing his eighties, Jungk looks frail. But his determination and human warmth are obvious. He remembers clearly that day in Hiroshima that led him to pursue futures as a life-long vocation: "I interviewed a couple for German television who were aged 50, but looked as if they were 80. They both suffered from leukaemia. They had become critically ill in '52 or '53 and when I met them it was 1955. It was likely that they would die within two years. The man asked me, 'Why is

Robert Jungk, 1952



America's technological progress and here was I putting that into doubt and saying, that may be all very beautiful but it en-

dangers our future.

it that all those very intelligent people who invented the bomb never thought about the long-term consequences, so that years after the war we are dying, and maybe even the future of the nation dies through the genetic consequences of the bomb?'."

Jungk realised then that, as a newspaper man, he had always run after stories when it was too late, when the catastrophe had already occurred. However, there were now instruments of power and destruction that threatened not only the present, but the future too. "I thought, I must address myself to this new situation where it has become possible to reach far into the future through technological power. At first I thought it was only the nuclear issue; then I saw it was bulldozers

too, pulling down whole forests. I realised that I had to warn people about the possible negative consequences of modern technology."

In The Future is Already Here he wrote, "the future is not something far away, because what we do now has future implications". Published in 1952, the book was one of the first to openly criticise America. "At that time everybody admired America's technological progress and here was I putting that into doubt and saying, that may be all very beautiful but it endangers our future life."

The book did cause some trouble, but not immediately, Jungk explains. "It got me into trouble with many people later – for instance I still had an American passport and they took that away from me, but not right away. They did it later on because I was

on television too often. But on the whole I don't want to exaggerate that – I have never been really threatened in a dangerous way. I have been thrown out of newspapers – the weekly I wrote for 15 years threw me out because of my banned book in Switzerland – and I had to leave a newspaper because I was too critical of science and technology."

ungk speaks enthusiastically about his involvement in the establishment of the World Future Studies Federation. "I was very active in peace work after the war. One day an English Quaker came to Vienna where I lived at the time and said 'Mr. Jungk, do you have any ideas for the Peace Movement? Because the Peace Movement is stagnating and we can't get ahead.' And I said yes, I think I have one because the Peace Movement always talks about war. That's good, but you never gain a positive image of what 'peace' might be and what benefits people would derive from it, apart from not being cut to pieces and being killed. But there are other benefits from a peaceful society where you don't spend so much money on weapons and you don't have a potent military structure. It was at that time that there was a very interesting exhibition in London about the future of Great Britain (the Festival of Britain) and I said why don't we do a similar exhibition on the future of mankind?

"So we formed a committee which was called Mankind 2000. We got together in Oslo in '68 with about 70 people and out of that developed the World Future Studies Federation. We decided to meet again because it was a new experience. What was important was that it was an inter-disciplinary experience. There were sociologists, psychologists, people interested in the future of technology. For the first time you had an inter-disciplinary group working together and discussing the future. The next meeting was held in Kyoto in 1970. It was very important because this was the first time that we involved more Asian participants. The next one was Rome with the

Below:
The dust jacket for
Robert Jungk's
Tomorrow Is Aiready
Here (1954), the
English edition of
his Die Zunkunft Hat
Schon Begonnen.





help of a Catholic organisation which had taken an important role in developing futures studies.

"Eleonora Masini and myself had opted in Oslo and Kyoto for what we called 'human futures' – others talked about technological or social futures, but we said 'human futures' because if the human personality is forgotten, then we won't have a good future. So in a very curious way the people who helped us on that were the Catholics because they also think about the human soul. So there was a kind of natural alliance which came out of that. You still had the technocrats there, but our interest was to further what we called human futures. This seemed even more important as time went by."

learly, one of Jungk's themes is the tendency for technology to develop, while too often leaving deeper human concerns behind. This was addressed in *The Everyman Project* of 1973. "The main thesis of the book was that the real treasures in futures are not in the ground. The real resources are within us. But most of those resources are neglected because many people are arrested in their development at a certain age, and because human development is seen only as educational development – you learn more and more but you don't look at your inner sources of imagination. So the book said that there are hidden resources in all people which we should develop. In 1950 there was a famous lecture by Gifford on

'Creativity'. He created the word and I saw that one key to the future would be human creativity."

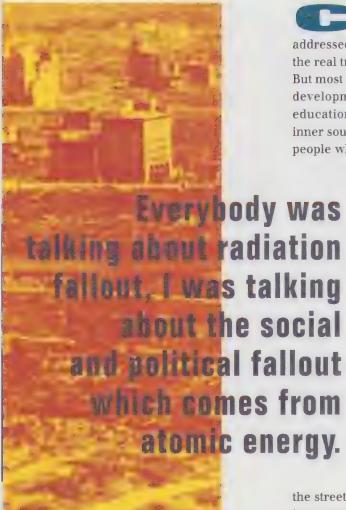
Around the same time, Jungk gave a paper in Hawaii called 'Three Modes of Futures Thinking' that helped to define the notion of critical futures thinking. He expresses the key point this way: "I thought that there were two main aspects – there was critical futures where you analyse, and creative futures where you imagine – I think I called it 'imaginative criticism' where you think what might be wrong, what could be different. I wanted to imply that even in criticism you can't rely on your analytical power, you also have to think 'how it could be better?' – and then compare what you imagine as a better state to the present."

In 1968 Jungk was offered a teaching role at the Technical University in Berlin where he started a course on future technologies. "I had many more people coming than any other professor at the university. This inspired the idea to involve the students in creating this 'other' future. We said, 'we are not going to give these seminars in classrooms, we will do it outside the university where people come by – on the campus.' We later did it where people from

the street could join in. That was after the Paris riots of '68. We didn't want a closed ivory tower university – we opened it to the public, to the community. Nobody did that – everybody talked about it, but my students and myself actually did it. When somebody stopped and asked what was going on I said, 'Please come in. Listen. You can talk too.' This actually created the first futures workshop.

"I continued my courses until about '75 and then stopped because I was very much involved in the anti-nuclear movement. German industry was putting in more and more nuclear plants and there was a popular movement growing against this. I became extremely active in writing and observing this scene of the nuclear enterprise. I saw that we always protested only about the biological impact, the health hazard of nuclear power, but not enough about the political and social hazard. You see it now in Russia, everywhere – to guard against social upheaval you have to install more and more security; you have to examine people working in an atomic plant; you have to have special zones around nuclear establishments because you are afraid of sabotage, so this makes for what I call 'the new tyranny'. What they are really after is not only the nuclear power, but the political power they can derive from that because they have become the 'protectors' of the citizens.

"I pointed that out – everybody was talking about radiation fallout – and I was talking about the social and political fallout which comes from atomic energy and so I wrote a book called *The Atomstadt*, (*The Nuclear State*). It was published in England by John Calder. It was published in France. It's very interesting – the French publisher was bought by the power industry so that he couldn't go on publishing! But the book was a tremendous success – for instance it helped in Yugoslavia and Poland. It had a great impact because they were about to start nuclear power there and people had an argument against it."



Jungk has spent many years of his life arguing for the human factor. But at the same time the technologies have continued to develop. How does he see the situation in 1992 and does he think that human or cultural innovations, such as the futures workshops, are beginning to balance out technical change? "More and more people are doing futures workshops and I can tell you why. In the '80s and '90s you have had these immense upheavals in East Germany and everywhere. People think that they are against totalitarian power, but also see that representative democracy is not enough - it cannot bring what the people really want. The grievances and the wishes of people, the channels are too narrow and so they go to the street. But when they go to the street there is a lot of heat and nothing comes out of that, the heat is dispersed, it is not put to any use.

"So between mass demonstration and representative democracy you need new democratic institutions where people can express their grievances and ideas. That was where the futures workshops came in. They have sprung up all over the place in communities who want to re-organise and say, 'Well how can we do it differently?'.

"There have been futures workshops in many places, not only among people who want to express their views, but also in business. Business even takes over the term and the notion of the 'futures workshop'. For instance the energy producers – who are my long-standing enemies – put up a thing called a 'Futures Workshop', a big industrial exhibition, claiming that they are creating the real future by getting more and more energy. Clearly, they've misused the idea."

hile writing his autobiography, Jungk has been looking back over his life and considering the key insights. "The most important thing is never to give up. In many ways these days people give up too early. They just give up. But my main experience is that one should never resign. One should always stand up again. My earliest toy was a little plaything, *Stehaufmenschen* we call it in German, which has a round bottom. You push it over and the figure falls and promptly gets up again. That's the story of my life. Whenever I have been pushed down it has weakened me because it took away all old securities, but it also strengthened me, because it gave me new opportunities. In fact I have to 'thank' Hitler in a certain sense because otherwise I would have been a provincial German. He threw me out of Germany; I had to go into the world. As a result of Hitler I became a planetary citizen. So I feel that every negative event can be an opportunity. You can turn even the worst negatives into something new and positive. If you can learn how to do that, then you don't give up; you can go on living. Then you can go on to the future.

"So there are two sides to our contemporary crisis. On the one hand it could destroy us – there's no doubt about that. But it is also a profound challenge which gives us the opportunity to develop and create something new. It will take time, but there will be advances: we have almost no slavery today; we have more women's rights. It is by no means a perfect world, but all these things have been started by small groups. It is the small groups, or even individuals, who go on developing their own ideas and believing in their own strength, who can make an impact and make the difference."

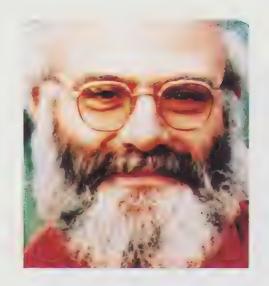
Jungk's view is that if people use the powers that are available to them, then the future, as a 'place to live in', is far from being lost.

"I wouldn't say it's metaphorically a good place, but it is not an entirely disastrous place. I'm not an optimist, I'm a pessimist, but a pessimist who still believes that not everything has to be bad... an optimistic pessimist, perhaps. We can slow things down which are negative and we can also develop the first new shoots from the soil. The important thing now is to create seedbeds for social innovations; places where people can take ideas. The ideas are nurtured and they can grow. From these seedbeds emerge the projects, the real practical changes that over time move our civilisation from its

Melbourne University. His last story for 21 • C was on J. G. Ballard.

present self-destructive course."
Rick Slaughter is a lecturer in future studies at

I'm not an optimist, I'm a pessimist, but a pessimist who still believes that not everything has to be bad.



Not since Freud have medical case studies fired our imagination as much as those of Dr Oliver Sacks.

His unique approach to the secrets

of the mind has had remarkable impact in both paperback

and Hollywood. The world's most famous neurologist talks

as packsi

to Robyn Williams.

York. Actor Robin Williams, who played Sacks' character in the film version of *Awakenings*, described the neurologist as "part Schweitzer, part Schwarzenegger. He's six foot one, an actual weight lifter,

but looks like Santa Claus."

hy should some case notes on patients collected in a short book become a world be-stseller? What was it about *The Man Who Mistook His Wife For A Hat* that moved so many readers that one even wrote an opera based on it. Why did two of Hollywood's major drawcards – Robert de Niro and Robin Williams – become so excited about *Awakenings*? It helps if you meet Oliver Sacks – the answers become obvious. For a start, he is a master story-teller. His cases develop like detective stories. Secondly, he is without question one of the most gentle and humane scientists you could wish to encounter. Both qualities shine from every sentence he writes or speaks.

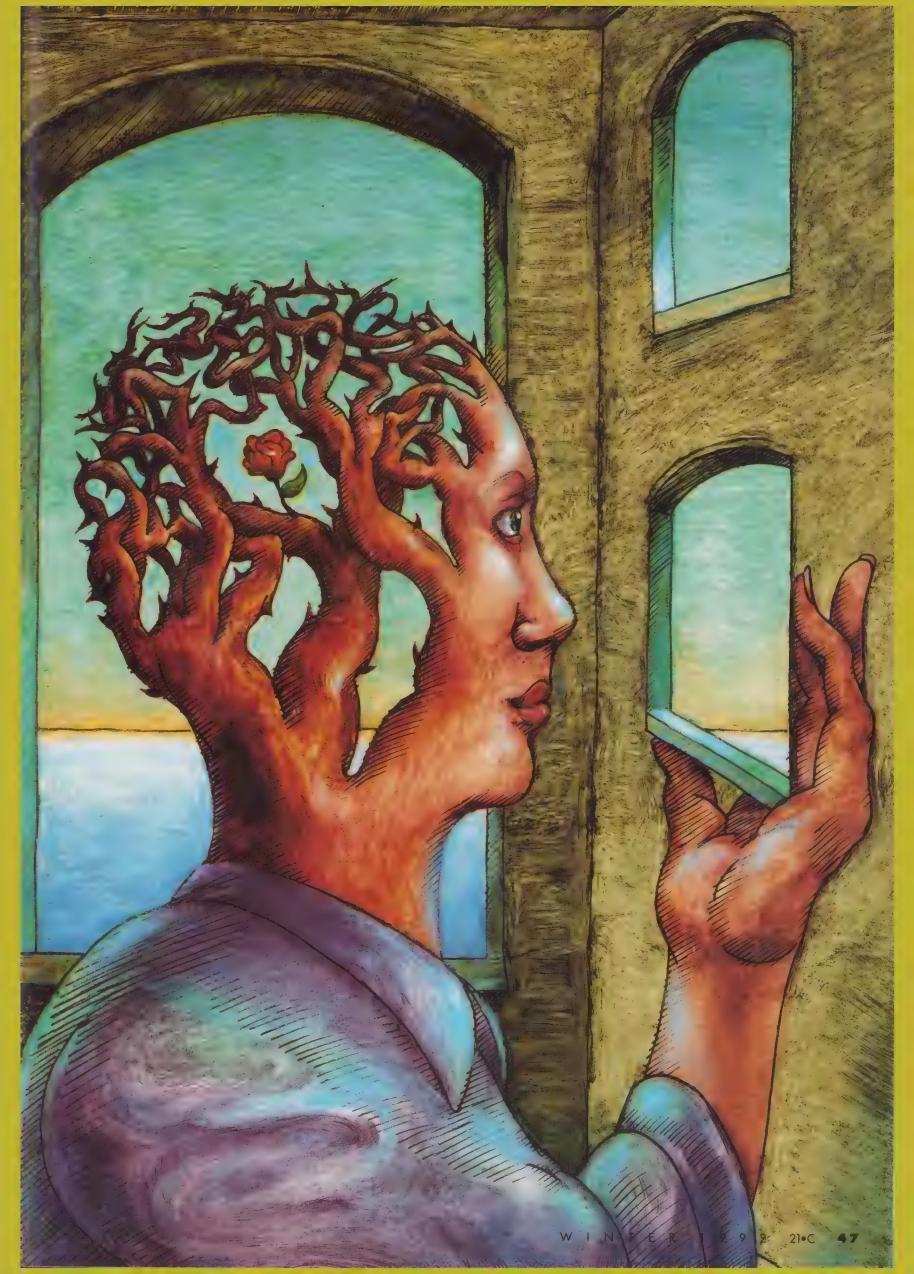
Oliver Sacks is also a very good neurologist. His reading is prodigious. His thinking about the metaphysical and social aspects of the human brain is internationally renowned. No enquiry, from an audience at the University of Sydney where he gave a lecture recently, or during this interview, was left without an erudite reply and usually an illuminating story. "Perhaps it's because I'm Jewish," he says, "that I answer most questions with stories".

Oliver Sacks went to school in London (with fellow neurologist and media personality Jonathon Miller) and then attended Oxford University. He is now the Professor of Neurology at the Albert Einstein College of Medicine in New

His last visit to Australia (where he has a brother, also a doctor) was to speak in Sydney and then at the Adelaide Festival's Writers' Week. Both events were sold out and I have rarely seen a speaker so sympathetically and warmly greeted. Oddly enough he is a very shy public person. He took 20 minutes to work up the *chutzpah* to meet his audience in Sydney. Once there he was splendid, but often took long pauses to gather his thoughts. In this interview he was more relaxed. This is something of what happened.

R.W.: What are you studying in England in terms of migraine and its inspiration for your writing and thinking?

O.S.: I'm fascinated by the visual patterns – mostly geometrical patterns – and hallucinations which people can have before the headache. Sometimes there is a zigzag pattern which expands like a crescent and is very bright, but one can also get strange patterns like lattices, cobwebs, spirals, funnels, tunnels and very complex polygonal forms which look rather like some of Buckminster Fuller's constructions. There was a recent exhibit of paintings of these things and they fascinated me all over again because now I think we see that patterns like this can emerge spontaneously in all sorts of natural systems – in chemical systems and other self-organising systems. It's almost as if the neurones in the visu-



al cortex create these geometries by themselves. Back in the last century some people used to think we had a sort of kaleidoscope in the sensorium. Now I think we see that this kaleidoscope is a self-organising geometry of nature. One has a wonderful direct view of this, a privileged hallucinatory view, before the migraine and that excites me. Something that seems to be so trivial can in fact be a sort of peep-hole into a universal process in nature.

These are people who despite the pain or the promise of pain are able to paint pictures or produce the pictures that you described?

Yes, sometimes one gets this visual aura without pain and vomiting, but it does seem amazing to me that they can sketch it briefly and then reproduce these things later. Though the patterns I think are so remarkable that they really impress themselves on the mind and so if only one can detach oneself sufficiently from the unpleasantness of it all. What sort of impressions do these pictures give you of the mind?

Well, if this is *the mind* then it's a very primitive part of the mind which seems to build up geometrical constructs in time and space. I think this sort of thing might form a sort of screen for higher level images and thoughts, but it really does make one wonder if there isn't some sort of geometry or geometrising process built into the circuitry of the brain. What actually causes migraines in the first place? Is it constricting of the arteries?

People are still unsure about it. Certainly constriction of the arteries can cause migraine but whether all migraines are caused this way one doesn't know. Some migraines can be set off electrically, some by flickering light, some interestingly by looking at patterns similar to the patterns of the aura. Sometimes even by thinking of these patterns. I know someone whose migraines are set off by asymmetry. If a but-

Something that seems to be so trivial can in fact be a sort of peep-hole into a universal process in nature.

ton is wrongly done up this produces a peculiar expanding distortion of the visual field.

It is part of the legend that creative people – artists, geniuses – many of them have had migraines. Is there a pattern that you have a slight predisposition to migraine if you're more creative than others?

Well, I like to say to my patients that all the best people get migraine, but I think it probably occurs across the board in all people, all cultures, all types. You mean they get them in the deepest, most remote parts of Brazil and New Guinea and so forth?

As far as I know. I would like to know about, say, Aboriginal people's migraines here.

One thing that has been quite fascinating reading your books is the way in which you describe people being deprived of crucial things which make them who they are: memory, being able to perceive the world around them so they can recognise faces or objects or loved ones. Yet as these essential parts are taken away from them nonetheless they remain people. I wonder whether you've thought much about the question of how much you can possibly take away and still have a person?

I never dared to put this fully in what I have written but it is certainly in my mind. I've never really written about people who've had damage to the frontal lobes which is the part of the brain where judgement and character seem to be most determined. I think that one can have very profound changes in character if there is frontal lobe damage and one may then feel that there is a different person and that in some sense the identity hasn't been preserved. One wonders in a dementia of someone with Alzheimer's disease how long the self is still there. I once told a colleague who was writing on the subject: if you write on it, please don't call your book The Loss of Self. And she called it The Loss of Self (laughs). Sometimes even despite tremendous damage the old self can suddenly emerge with Alzheimer's disease. I think that style or self is a very deep neurological construct. I had one patient with severe cerebral palsy who had no use of her limbs and was blind, but she had a very vivid self and picture of the world, although I think it had been conveyed to her mostly through language.

Look at the way traditions in all parts of the world believe that from the minute you're conceived you have become a person and therefore sacrosanct, right through to the question of

where your soul goes when you die. Now I can have no concept of me existing without a body giving me hormones, impulses, lusts, hungers, and as far as I'm concerned, once that body has gone I cannot exist. Yet the assumptions throughout millennia have been that you continue somehow. Now is it possible do you think to have a person in any way without those essential bodily trappings?

I think not. Even identical twins are neurally different at birth. The circuits of the brain are so different that this alone makes any computational view of the brain difficult to maintain. It's more like a jungle.

Individuality starts before birth, and certainly goes on massively from birth onwards. We all become selves from the start. But I think that self-hood depends on the unique neural circuitry and the way in which it has been moulded by experience and of course it's *self*-moulded experience. I can't imagine anything later.

There may also obviously be some things which are not given by experience but are dependent on the innate properties of the circuitry themselves. For example, the strange geometrical patterns of migraine. And that's built in, but even to have those you must have a brain, because I can't imagine existence – any sort of soul – without that.

No, and one wonders if there is a soul that goes on, what on earth it could be like?

William James wondered about this a lot; whether a life



Robin Williams plays Dr Oliver Sacks in the film based on his book *Awakenings*, with Robert de Niro playing his patient.

somehow impressed itself on the cosmos. Obviously in one sense, one's existence and one's actions alter the universe in some way.

The context of this is not only religion and where one goes – or if there's any part of you that will go anywhere – but also the continuing discussion about whether computers can have any sort of mind, however clever.

Well something which I think is tremendously important is the notion that one really can't have a mind in a bottle, *in vitro*. The mind needs to be in an active organism. And activity and movement and exploration are all important. Typically, if a part of the body ceases to be active and ceases to be sensible, then it drops out of the mind. This is exactly what I describe in one of my books *A Leg To Stand On*, where this paralysed senseless leg no longer seemed part of myself.

You'd had some sort of accident hadn't you?

Yes, I had met a bull on a mountain in Norway which I think was probably a quite harmless animal and just grazing, but I panicked and I fled down a path, fell off a cliff and did my leg in. I thought I'd done myself in.

And it was repaired and even the nerves were reconnected but you couldn't feel it, your brain didn't want to recognise that the leg was still there.

I think maybe all of us have had something similar, perhaps after going to the dentist when part of the jaw becomes insensible and it can be very weird, you may feel it's not part of you. Certainly, when people have dental injections on both sides they lose their tongue and sometimes panic.

Just to finish the story, you got it back in the strangest way, the doctor... you finish the story, what did he do to you?

The surgeon was sort of mechanically-minded in the right sense. He said, 'Look, you disconnect things, we reconnect them, that's that'. But it's not enough to reconnect things, the flow has to start again. And obviously this requires a certain degree of neural healing first. But that's not enough. One needs action, one needs movement of some sort to restart the neural flow, and for me music played a vital part. I'd forgotten how to walk. I'd forgotten what neurologists sometimes call one's 'kinetic melody'.

Mendelssohn.

Yes, I had a tape of Mendelssohn and it suddenly came into my mind and I found myself walking towards it. It gave me back my own melody.

Where did being thrown into the swimming pool come into things?

That was a little bit later. I was walking then, but in a rather odd, stiff-legged fashion, and I saw another surgeon who commented on the fact that I didn't seem to be using my knee. It was as if I'd forgotten how to use it. I said, well I try and use it but then I stumble, and he asked me what my favourite activity was. I said swimming, I love swimming. I was a swimming baby and my father was a swimming champ – he threw us all in when we were a few months old. So swimming is sort of instinctual with me. Well the surgeon suggested I go to a local pool. I went there and was sort of trembling on the side holding my walking stick and there was a languid life-guard who uncurled himself and asked what's the matter. I said, 'well I was told to have a swim and

Parkinson's is still not a good thing to acquire, but there is very much more hope for someone

than in the *Awakenings* days

I'm afraid'. Then with a rather mischievous smile he took my stick with one hand and pushed me in with the other (laughs). I was very shocked and indignant and competitive all at once and immediately started swimming after him. When I got out of the pool I was walking normally.

Had you been set up?

Absolutely. When I told him this story he smiled and it was evident that he'd set the whole thing up. He told me it had been just the same with a dog of his who'd broken its leg and was only walking on three legs. He'd taken the dog out to sea and thrown the dog in and the dog just started paddling back in and scampered off on the shore. I was actually rather pleased to be compared with a dog because I [Cont. page 92]

RUPERT



SHAMAN, SCIENTIST OR CHARLATAN?

Sections of the science community want to burn his books while others want to applaud him for rekindling and trying to prove a fascinating philosophical viewpoint. Andrew Nethery and Adam Lucas meet the bio-heretic.

hen Rupert Sheldrake wrote that science was alienating us from our living experience he created an uproar within the science community. This is nothing new for the infamous Dr Sheldrake whose radical evolutionary theories and holistic approach appear likely to do for biology what Stephen Hawking has done for physics – thrust it into the mainstream culture.

Sheldrake's most recent book, *The Rebirth of Nature* (1990), is an accessible attempt to bridge this gap. In this book, he looks at the implications of his theory for our concept of nature and humanity which he claims has become distorted by the institutionalisation of scientific mechanism.

Mechanism is the belief that nature can be pulled apart like a machine and understood in terms of its component parts. Life and the universe are just 'matter in motion'. They have no intrinsic purpose or self-creativity.

Although such a belief may seem banal, it is often taken for granted by both lay people and scientists. Sheldrake, like a growing number of scientists, believes that this view is wrong—that we need an ecological, organismic view of reality to properly integrate our personal experiences with our scientific understanding. He cites the massive environmental devastation of the planet as indicative of scientific mechanism's conceptual failure to come to grips with the complexities of life and human society.

Sheldrake's theory of formative causation starts from the assumption that there is a kind of memory in nature of all its past states, which quite literally gives the present its form. This memory is specific to different forms, patterns and processes.

What Sheldrake proposes is a new causal principle; formative causation – the effect of like upon like. It is an effect which is apparently instantaneous and does not deplete over long distances, but is cumulative. For example, information about things which are alike 'collects' within this memory over time.

In a sense, Sheldrake's ideas are not new. As he points out, many philosophers, scientists and theologians over the centuries have held similar beliefs, from Buddhists to Aristotle to Henri Bergson. The main difference between their ideas and his theory is that formative causation is empirically testable.

For the many die-hard mechanists and 'materialists' of the scientific establishment, Sheldrake is attempting to revive a scientific tradition which they had hoped was long dead. Sheldrake is a holist, and describes the philosophy of nature which he and many other scientists are attempting to revive as *organicism*. Holism and organicism are dirty words in many conservative scientists' minds, despite the fact that until recently such ideas were common amongst many eminent scientists. Sheldrake and many other scholars argue that mechanism and materialism's preeminence in modern science has more to do with political and economic expediency than any scientific theoretical superiority.

Sheldrake is profoundly dissatisfied with the present state of biology, because it teaches students that plants and animals are just machines, the end products of blind chance in evolution. As an undergraduate, Sheldrake explained that he began looking for alternatives to this mechanistic view. Shortly after complet-





ing his doctoral thesis, his persistence bore fruit:

SHELDRAKE: In 1973, I first had the idea, which came as a kind of blinding insight, that there's a kind of memory in nature, a kind of non-material memory. This was the germ of my theory of morphic resonance: the idea of the 'habits of nature', which I ultimately wrote up in my first book, A New Science of Life, and then developed in *The Presence of the Past*.

The basic idea is that forms and patterns in nature - which includes the shapes of animals and plants (the way a kangaroo develops for example), and the instincts of animals which are kinds of forms and patterns of behaviour - and also the forms and patterns of human society and human thinking. All of these kinds of forms and patterns are subject to a process called formative causation. They're organised by fields, which I call morphic fields, from the Greek word morphe, meaning 'form'. These fields contain an inherent memory.

What this amounts to is that each species has a kind of collective memory. Each kangaroo develops in accordance with the 'kangaroo memory', which includes the development of the form of the embryo, and the growth and development of the animal, and also the instincts. So the instincts of the species are an inherited habit. This memory doesn't just get stored in the chemical genes, as conventional biology assumes, but rather depends on a direct connection by the process I call morphic resonance, through space and time.

So it's as if organisms tune in to all previous organisms of the species and in turn contribute to the collective memory. This collective memory is cumulative. So, for example, if you train rats to learn a new trick in Sydney, the more rats that learn it here, the easier it should get all round the world. And this should happen independently of conventional forms of connection or communication.

So it's not like Lamarckism, where you'd have acquired characteristics being passed on to the next generation?

It's like super-Lamarckism, because you have acquired characteristics being passed on, not just to the descendants of the animals that have acquired them, but to all the other ones of the same breed or species. So it's more extreme than Lamarckism, in the sense that it enables the inheritance of acquired characters, not through modification of the genes. All this can happen without changing the genes.

What's a mechanism or process by which that could take place? Do you call that morphic resonance?

Morphic resonance is based on similarity, the more similar something is to something that's happened before, the greater the resonance. I'm suggesting this resonance doesn't fall off with space and time. As for how the resonance actually moves, this is a question where you can have a variety of models. If it happens there should be all these predictions that come true. Like animals learning quicker, crystals crystallising faster of new compounds the more often they're made around the world

Could you give us some examples of phenomena that could be explained by your theory which can't be explained by conventional biological theories?

The Problem of Form in Nature

In the history of Western science and philosophy, there are three major streams of thought regarding the origin and growth of forms in nature. All three have roots in classical Greek philosophy.

The oldest tradition is commonly known as animism, and different versions of this philosophy were held by Zeno, the Stoics and Aristotle. The animists, or hylozoists believed that everything in nature, whether animal, vegetable or mineral, had a soul or spirit which drew the immature form towards its mature, fully-realised manifestation. The Stoics called this soul the pneuma (meaning "breath"), which suffused the universe. Aristotle called it entelechy, by which he meant a non-material organising principle specific to different forms, but inherent within all matter. Such a belief assumed that nature was alive, and in some sense both sentient and divine.

This was the common belief of most people up until the Middle Ages in Europe (and still is in many countries today, for example, amongst Australian Aborigines), and survived in intellectual circles from the Renaissance right up until the early 20th century, firstly in the alchemical or Hermetic tradition, and then later in vitalism and Romantic Naturphilosophie. Like Sheldrake, scientists from Copernicus through to Hans Driesch subscribed to this view, as did philosophers from Giordano Bruno (who was burnt at the stake for his untimely heresy) through to Spinoza, Liebniz, Goethe, Hegel and Henri Bergson.

For many scientists today, however, such beliefs are "pre-scientific". They are "just superstition" and have no foundation in fact, although all of Chinese medicine, for example, including acupuncture, is based on such "superstition". Despite the efforts of the so-called 'rationalists' to denigrate these beliefs, they are remarkably persistent. Indeed, it could be said quite accurately that the modern 'common sense' or 'scientific' view is a mere cultural aberration in the vast history of animistic beliefs throughout human history.

The second tradition which has been probably more

There's already a lot of evidence from the investigation of animal behaviour. Rats that learn new tricks, for example, do get quicker at learning; not only in the same lab, new generations of rats learn quicker and quicker. In one of the biggest series of experiments ever done, which started at Harvard, then continued in Scotland, and concluded in Melbourne, the rats got quicker and quicker as time went on. When the people stopped doing the experiments in America, they started doing the same experiment in Scotland. Their rats, as it were, took over from where the American ones had left off. They started off learning 10 times faster than the American ones had at the very begininfluential in recent times springs from the philosophy of Plato. Plato believed that the material world was the most lowly, corrupt and fragmented manifestation of pure forms or Ideas in the Mind of God. For Plato, the material world was not sacred or self-creating, it was a pale and distorted reflection of Eternal Ideas. Like the earlier Pythagorean belief in a timeless mathematical order which lay behind and beyond all things, Plato's ideas or essences similarly gave the material world its life and its form, imposing order on otherwise chaotic matter.

Plato's philosophy was extremely influential in the early Catholic Church and for the founders of Protestantism. Many of the first scientists, such as Francis Bacon and Isaac Newton, were Protestants and neo-Platonists. Newton even practised a neo-Platonic form of alchemy throughout his life. Platonism was attractive to these early scientists because, according to it, God's eternal laws governing the behaviour of the natural world existed independently of this world and could be discerned through mathematics and rational, objective thought. The eternal laws of nature were thus Ideas or Pure Forms in the mind of God. Throughout scientific history, the discovery of these laws has been thought to imply the possession of mastery or domination over the realm of nature at which those laws apply. Many of the early quantum physicists were neo-Platonists, including Werner Heisenberg and Arthur Eddington, and many scientists (particularly physicists) still are, although they may not be aware of it!

The third concept of form which emerged from ancient Greece was atomism. Atomism is the basis for most of the materialist philosophies of the modern era, and is undoubtedly the dominant concept of form in science today. Originally expounded by Leucippus and Democritus in the 5th century B.C., atoms were thought to be the smallest objects out of which everything else is composed. These atoms were thought to be hard, gritty and indestructible. Yet despite the splitting of the atom into smaller and smaller sub-atomic 'particles' throughout this century, and de Broglie's discovery of matter waves in the 1930s, it is remarkable how persistent the

old idea of atoms as the "basic building blocks of matter" still is amongst scientists.

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This kind of materialist thinking has been most influential in biology since the 1930s. August Weismann's reinterpretation of Darwinian natural selection claimed that an animal's genes were the determinants of all physical and behavioural characteristics. The discovery of DNA by Rosalind Franklin, Francis Crick and James Watson in the 1950s led many scientists to believe that they had found the key to life itself. Incredible advances in molecular biology over the last 40 years have culminated most recently in the Genome Project, the 'race' to sequence the human genetic code. As far as many of its supporters are concerned, the decoding of the genetic 'book' will unlock all the mysteries of human behaviour and bodily functioning.

However, there are many problems with this kind of thinking, not least of which is the so-called nature/nurture debate, that is, how much of our behaviour is the product of social/environmental influences and how much is genetic inheritance? A more fundamental problem is that nobody has yet been able to satisfactorily explain how genes give rise to form (morphogenesis). If all the genes in all of our cells are identical, what causes some DNA to

make cornea cells and other DNA to make

white blood cells? And how does the DNA co-ordinate the billions of cells in our bodies to make a nervous system, or a skeleton, or a brain? Neo-Darwinism, the modern orthodoxy in molecular biology, has not been able to explain any of these things.

Sheldrake believes that although DNA plays a fundamental role in the production of all the proteins which make up living tissue, DNA and genes do not give rise to form. Sheldrake believes there are fields of organisation or spheres of influence (morphic fields) which surround material forms and in which they are embedded, and it is these fields of organisation, which (like Aristotle's entelechy or a magnetic field around an iron bar), determine how specific forms come into being. What orthodox mechanistic biology currently attributes to DNA and genes, Sheldrake attributes to morphic fields. His theory is such a sweeping attack on current orthodoxy, it is perhaps not surprising that his peers have ostracised and ignored him.

ning of this series of experiments. In Melbourne it was shown that this effect didn't just persist in descendants of trained rats (the Melbourne rats started off quick too and got quicker), but it occurred in all the rats of that breed.

There are other examples. It's already known that new compounds are difficult to crystallise, as time goes on they get easier to crystallise. This is just what I'd expect to happen, but chemists explain this in terms of fragments of crystals being carried from lab to lab on the beards of migrant chemists (laughs). It's never been rigorously tested, and I'm suggesting that even if you keep migrant chemists out of it and filter dust

from the air (the other explanation is that fragments of crystals are carried around the world in the atmosphere), even if you exclude those transfers of physical bits from previous crystals, there should still be this increasing rate of crystallisation owing to morphic resonance.

Now exactly *how* morphic resonance works is a question I leave open. I'm just postulating that this *is* happening. One way of explaining morphic resonance might be in terms of what the physicist David Bohm calls the "implicate order". He thinks that morphic resonance would work by things that have happened going into the implicate order, which is beyond [Cont. page 94]

THE WAIT OF THE WORLD

The end is nigh if we all just sit around and wait for it, says David Suzuki. But it will take more than science to bail the world out of its current environmental dilemmas. If we want to look forward to a future we must look back to the past for advice. Wilson da Silva gets some stone-age wisdom from the outspoken geneticist.

ome years ago an Amazon Indian named Paiakan stayed with David Suzuki, the Canadian geneticist and science broadcaster. One of the first things the proud chief did on arriving at Suzuki's Vancouver home was insist on new bedsheets and blankets. Suzuki was puzzled and a little peeved, but complied. "Suddenly a thought struck me and I asked, 'Are you worried about disease?'" Suzuki's eyes were alight as he recounted the tale in his Sydney hotel room recently. "Paiakan said, 'Of course. In my village 14 people died just a few years ago of measles'." At that moment, in Suzuki's own living room, the gulf between the stone age and Western technology clashed.

Here was Suzuki constantly fretting that human progress was creating an ozone hole, global warming and desertification, while his guest was having a hard time just keeping the 20th century from killing him. And yet, contends Suzuki, the painted and feather-crowned Paiakan and the world's 300 million aboriginal people have more of an answer to the global problems of modern man than most politicians and technocrats. He calls it, like the title of his new book co-written with Peter Knudson, The Wisdom of the Elders.

"Our society is bankrupt of ideas. It is simply indisputable that we are on an unsustainable path. What I tell people over and over is, talk to your elders, talk to someone who has lived in Sydney for 70 years and ask him or her 'What was Sydney like when you were a child?' They are a living historical record of the enormous changes during the span of a single human life. Take what they tell you and project that into the future – and you will know with absolute certainty that our grandchildren will have nothing like the opportunities we had.

"We've always said in the past, 'Yeah well, that's progress'. The Americans are very fond of saying 'there's plenty more where that came from'. The fact is, there isn't. And I don't consider it progress when the very support systems of life are being compromised."

Before the Industrial Revolution steamrolled in, human societies lived inside the ecology around them in a sustainable way for thousands of years. "The modern attitude is that aboriginal knowledge is all superstition. There's a disbelief that there's anything in what they have to say that is relevant to the way we live. 'We can't go back to the land, what the hell have we got to learn from them?' Yet we accept the collapse of the environment around us without a god-damn whimper. Our environment minister in Canada warned (earlier this year) to keep children out of the sun (because of the ozone hole). My wife looked at that in the national newspaper and wept. Do we just accept that we have to keep children out of the sun now? Is that progress?"

Suzuki is nothing if not provocative. The bushy-haired, bespect-

caled geneticist of Japanese descent, a professor at the University of British Columbia, is obsessed with halting what he says is humanity's headlong rush into an environmental catastrophe. His popular science television programs like *The Nature of Things*, 16 books and constant lecture tours have made him well known in the English speaking world, although he has only attained cult-like status in Australia and his native Canada.

He has been called an environmental fundamentalist and a neo-Luddite, an anti-growth zealot trying to make humanity guilty about economic progress. But Suzuki says the very bedrocks of Western philosophy – economics and science – now threaten humanity. They have been wildly successful but are concepts, not reality. We have been so blinkered by these philosophies while speeding down the highway of progress that we now risk crashing headlong into a wall of reality.

"All of our politicians and business people from the left to the right proclaim economic growth is vital to our survival," he said. "But it is a system that places no value on clean air and water. What kind of system is it that regards the Exxon Valdez oil spill as a plus? It brought two billion dollars to the Alaskan economy. If one of the nuclear reactors near Toronto melted down, (the province of)

Ontario's gross domestic would go up as people used hospitals, and medical companies profited."

Science has also been a culprit, Suzuki says, but a revolution sweeping the world's leading scientific thinkers promises to liberate science from the strait-jacket that centuries of detachment and reductionist zeal have wrought. "The ecological destruction of the planet, which is being accelerated by the tools invented by science and technology, is now telling us that we need another dimension to science," he said. "Science applied without a sense of the planet as an entity is destructive.

"Many of the leading elder states people in science look at the activity of science and realise that its great strength is also a fatal weakness. We learn about nature from an isolated fragment – we bring a small part of it into the laboratory. But in removing it from its context, you lose all sense of how it all fits together. When you objectify the world you look at, you lose any sense of caring about it – you lose the context within which it has meaning."

In his new book Suzuki claims as allies some of the biggest names in science, including Freeman Dyson, Stephen J. Gould, Carl Sagan, Ed Wilson, Paul Ehrlich – who all say a sense of the ecological whole must be a part of science. "Here are scientists saying that we are missing something fundamental that connects us with other organisms... and all of this sounds very reminiscent of what aboriginal people say all of the time. Aboriginal people would never see themselves as removed from nature, they totally revel in their connection, whereas we distance ourselves. These (scientists) are people with



established scientific reputations, how can you discount that?

"This is an interesting conjunction between science and indigenous knowledge. The lesson is not that we must all become indigenous people – we can't – but that ultimately we need to have a different attitude towards the planet, the sort aboriginal people have and have had for thousands of years," Suzuki said.

Suzuki knows he and like-minded colleagues have an almighty battle on their hands in taking on the dominant philosophies of the West. He contends that humanity has less than a decade to change course before it becomes too late to avert the looming environmental crisis. "If you project all the curves into the future it looks very, very bleak," he said. "Population explosion, loss of ocean resources, topsoil degradation, ozone depletion, acid rain, massive pollution of the air and water, when you look at it in that global perspective it just tells you the planet is dying. We're losing 40 hectares of rainforest every minute, and 20,000 species a year become extinct. World food production peaked in 1984 and has been declining ever since (due to soil degradation)."

This contrasts sharply with conditions only 200 years ago, when European settlers reported unbroken tree cover stretching from Maine in the north eastern United States to California in the west through which squirrels could skip from tree to tree across the continent, and explorers of eastern Canada describing codfish so plentiful one could walk on their backs across a river.

"It's estimated 60 million bison thundered across the plains of North America before the arrival of Europeans, and six billion "But I can't give in to total pessimism, pigeons darkened the skies for days when they migrated. It just grieves me to hear people say, 'Gee, the fish don't come in here any-

more. We used to have a lot of pheasants out here, we used to have a lot of rabbits and ground hogs. Haven't seen any now for years.' When I compare what I grew up with in the 1940s and my children today, their quality of life has got worse. Sure, my children can see videos in the classroom but they can't go down to the beach and catch clams to eat because they're poisoned."

Things are changing, however, but too slowly for Suzuki. He said the environment is now a permanent part of political debate, and only recently have politicians realised the issue will not go away. A sign of this was the Earth Summit in Rio de Janeiro in June.

"At the first Earth Summit in Stockholm in 1972... every issue that we're dealing with (in Rio) – overpopulation, global pollution, species extinction – was raised. Nothing's been done and it's just got worse," he said. "The one big difference is, there were no heads of state in Stockholm. So at least the environment has become a political issue – that's one small step.

"Public concern about the environment is not going to go away. If the environmental crisis is not real, then it's a fad and it will just disappear. But there's simply no way that any serious scientist today can say the environmental crisis is not real. We're in the last years of the time when we can do anything about it. Politicians just haven't got that yet."

So what drives Suzuki?

Fear for the future of his children. "My wife and I often hug each other at night and cry for the future of our children," Suzuki said. "But I can't give in to total pessimism, I have an investment in the future."
Wilson da Silva is a journalist with Reuters news service. His last story for 21 • C was on Marvin Minsky.

Gyber

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Change multimedia, simulation and should attend in the line become a component of the new popular sub-culture – the Cross culture – an underground street-war lifestyle that has erupted with a sperignicius vicality in Tokyo, New York, Celogne and our own capital cities. A



The illustrations leatured in the . Cyberculture section are from the tearing exhibition I2 (The Interactive imagination) organised by The Australian Institute for Art and Technology for The Great Australian Science Show, These artists/designers/ animators employ technology ranging from low-end machines to Silicon Graphic Computers. Also featured is Piers Buxton, an Australian designer based in the U.K. using the high resolution image manipulation which is now possible on Apple equipment.

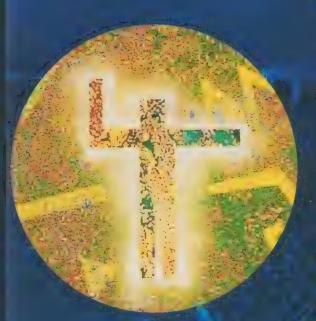
Editors of hits for whom A IDS and opone holes are just apother hitsard of growing up, another legicy of adults who hops too busy, too concerned or too committed to witness didn own neglect. At the Cyberculture has apawned its own magazines like Woys and Monoo 1000 and its own gurus like the phorpunk author. William Gibson, retreat drug guru, Throaty Ready. Muran Minsky – the Old Man of Artificial terroglobes, and the areadholded digit fresh, large Lanier. Man on heady of 21 of Mohamme Wark jacks in to the hit subsequent interesting for YR under development at a parasilals inggest VR research centre. We We interview and man who for each so much of this, William Gibson.

MATH ILLUSTRATION ON PAGES 56/57: 'THE DOCTOR'S BOX #3' BY DAVID MURPHY

GUITTE



IN I W WARK ENTY: the sub-culture of Cyberspace



by McKenzie Wark: A hip new lingo has infiltrated the mass media. 'Cyberapace', 'in permedia' and 'virtual ruality' have become the recinium to words of the '90s. After years of indifference and suspicion, the idea was not not only can be fun, exciting, and sexy has re-surfaced.

Two ideas in particular are now doing the rounds. One is that computer are not just for pencil-head types in lab coats and grey-suited accountants. Technology can be a tool for the imagination, opening up new terrains of images, sounds, experiences and concepts. The second idea has less to do with computers than with communications. By linking all the computer power languishing on desks and in basements, whole new forms of interactions again

The first of these two ideas orbits somewhere around the term virtual reality. The second is a vague nebula of possibilities sighted off the cyberspace cluster. Both have been around a long time; but have just recrystallised in the public's imagination. 'Hypermedia' is the next phase in marketing this dream to the public. The movie Lawnmower Man has cashed in on the trend, pulping the

A new generation of white-collar worker...

whole lot together with some silly old Stephen King haunted house clichés. The really interesting stuff on both these current trends can be found a little off the mainstream. Take a hyperspace bypass back through the cyberpunk sub-culture of the '80s, and you will find the creative source and force behind the present multimedia marketing push.

Cyberpunk is a cute name for a rather motley collection of people who thought and wrote and made art about technology over the last decade. Some of them were harmless. Some of them were dangerous. Like many other prophetic art avant-gardes in the past, they saw the future both more clearly and more crazily than their contemporaries. Like the romantic poets and the decadent artists of the 19th century; like the surrealists, futurists and constructivists of the early 20th century, they wanted to change life. They imagined

how it could be different, not only from the present, but from how the future was officially imagined to be.

Cyberpunk gathered momentum in 1984 with the publication of the first of William Gibson's novels, Neuromancer. Gibson has since published four novels and a collection of stories. There are half a dozen writers of cyberpunk fiction on the market, and other novelists like Bruce Sterling and Pat Cadigan have emerged. There is even a remarkable 'overground' cyberpunk magazine called Mondo 2000, as well as a host of tiny desktop published fanzines. Cyberpunk has gone beyond a sub-culture and is now a full-blown marketing category.

Gibson is an odd sort of person to have launched an avant-garde cultural movement. He is a small town, white suburban kind of guy who writes pulpy science fiction novels. Yet he was able to crystallise something that was in the air: the bleak, 'no future' landscape of punk rock and post-apocalyptic movies like Bladerunner

and *Mad Max*. Gibson imagined a way to escape from the street-level violence these films referred to. The way out was cyberspace.

In Gibson's world, cyberspace is a consensual hallucination created within the dense matrix of computer networks. Gibson imagines a world where people can directly jack their nervous systems into the net, vastly increasing the intimacy of the connection between mind and matrix. Cyberspace is the world created by the intersection of every jacked-in consciousness, every database and installation, every form of interconnected information circuit, in short, human or in-human.

This mythology of cyberspace is interesting for two reasons.

First, it provides an alternative to the boredom of suburbia without

having to deal with the danger of inner-city living. Every sub-culture needs a fantasy place to run away from suburban life, be it the rural fantasy of the hippies or the urban fantasy of punk. Cyberspace is a fantasy destination for white, middle-class suburbanites who realise that rural life is even more boring than the suburbs and the cities are becoming far too dangerous.

The other interesting thing about cyberspace is the way it recreates the idea of community. Every sub-culture needs an image of an outsiders' community to cling to, to run to. For the cyberpunk, this

community doesn't actually have a place. It's not a nightclub in New York. It is not a street in London. It can be accessed everywhere - by modem. Of course, the bulletin boards and e-mail systems are a poor imitation of the fully wired-up world of cyberspace, but it's the nearest thing on earth. Cyberpunk sub-culture is the first subculture which doesn't have a particular place of congregation - it's a suburban phenomenon made possible by the networks. There are now hundreds of bulletin boards around the world which have a cyberpunk style, where young cyberpunks discuss the latest hardware and software.

In a sense, sub-cultures are always a product of the media technology of the age. The classic sub-cultures of the '60s and '70s, from the mods to the

punks, were a combination of the electric world of rock 'n' roll with a style, a place and an ethos and a certain amount of drug abuse. The mods grew out of '50s austerity in Britain. They were the first generation of young people to enter mass white-collar employment and acquire a disposable income at a young age. So they spent it — on clothes and music and motor scooters and weekend trips to the seaside. They were a mobile community, growing up on television and rock 'n' roll. The first great pop music TV show, Ready, Steady Go!, spread mod style from one end of Britain to the other instantly, a fashion transformation that without television would take months or years.

The punk movements of the late '70s were where the youth sub-cultures launched by the mods finally crash-landed. Punk was a sub-culture based on the boredom of unemployment, not the tedium of white-collar work. It lacked the excitement and innocence of the mods — who were absolute beginners in the art of living in a consumerist, media-saturated world. Punk was a sub-culture created by young people in the late '70s who grew up on the media and its promises of the good life, and were bored with all that. It had let them down; "career opportunities, the ones that never knock", as a song from the time put it. The punks took the media technology of the time — the music, the fashion, the radio and video — and trashed it.



William Gibson: Neuromancer, Count Zero, Mona Lisa Overdrive

> William Gibson and Bruce Sterling: The Difference Engine

> > Bruce Sterling: Islands in the Net

Mark Leyner: My Darling, My Gastroenterologist.

READERS

Larry McCafferty, (ed)

Storming the Reality Studio

Michael Benedikt (ed)

Cyberspace; First Steps

Bruce Sterling (ed)

Mirror Shades



they don't drop out, they jack in.

Cyberpunk grew out of this negative sub-cultural style, but turned it back towards a positive celebration. Where the mods had been fascinated by consumerism and the mass media, cyberpunk is fascinated by the media technologies which were hitting the mass market in the '80s. Desktop publishing, computer music and now desktop video are technologies taken up with enthusiasm by cyberpunk in the place of rock 'n' roll. Computer networking is its alternative to the mods' pop TV or the punks' pirate radio.

Just as sub-cultures from mod to punk were the testing ground



for new styles of music and fashion, the cyberpunk crowd are the testing ground for new fashions in desktop technology. The rapid evolution from video-games to virtual reality has been helped along by the hard core of enthusiasts eager to try out each generation of simulated experience. The multimedia convergence of the publish-

The pilots in Baghdad flew in virtual reality.



ing industry, the computer industry, the broadcasting industry and the recording industry has a spot right at its centre called cyber-punk, where these new product experiments find a critical but playful market.

Where punk was a product of unemployment and the English art school, cyberpunk is a product of the huge array of technical and scientific universities created in the US to service the military industrial complex. Your typical cyberpunk is white, suburban, middle-class, and technically skilled. They are a new generation of white-collar worker, resisting the yoke of work and suburban life for a while. They don't drop out, they jack in. They are a fabulous example of how each generation, growing up with a given level of media technology, has to discover the limit and potential of that technology by experimenting with everyday life itself.

Sub-cultures are an art form. They can have their delinquent edge, it's true. Mods took too many amphetamines. Punks were a little prone to rioting. Cyberpunks sometimes have a romantic fascination with hacking into other peoples' computers. All this is a testing of limits, a pushing to the limit of the social norm. The enduring product of any sub-culture is a rapid innovation in popular style. Sub-cultures pioneer styles of life for the mainstream. In the case of cyberpunk, the networked world of cyberspace, the interactive world of multimedia and the new sensoria of VR will all owe a little to their willingness to be the test pigs for these emergent technologies.

There is also a tension in cyberpunk between the military industrial monster that produces technology and the sensibility of the technically skilled individual trained for the high-tech machine. Like all sub-cultures, cyberpunk expresses a conflict. On the one side is the libertarian idea that technology can be a way of wresting a little domain of freedom for people from the necessity to work and live under the constraints of today. On the other is the fact that the technologies of VR, multimedia, cyberspace would never have existed in the first place had the Pentagon not funded them as tools of war. The pilots who bombed Baghdad flew in virtual reality.

Even the peaceful applications of these technologies can be subordinated to commercial imperatives abhorrent to the free-thinking cyberpunk. There is a contradiction between the spirit of free enquiry and experiment and the need to keep corporate secrets and make a buck. Cyberpunk is a reflection of this contradiction. On the one hand it is a drop-out culture dedicated to pursing the dream of freedom through appropriate technology. On the other it is a ready market for new gadgets and a training ground for hip new entrepreneurs with hi-tech toys to market.

Cyberpunk may be over as a sub-culture. It was reabsorbed into the mainstream like every other sub-culture before it. Yet it signals a fundamental change in the way sub-cultures can form and oppose themselves to the mainstream. In effect, cyberpunk was the realisation that the new generation of media tools are also excellent resources for changing life, if only on the margins, and if only for a short while. Like all of the other avant-gardes and sub-cultures before it, it has added something special to the repertoire of postmodern life.



THE BEDTIME A CYBERPUN

TES FROM

Selected by McHenzie Wark

"The sky above the port was the colour of television, tuned to a dead channel."

WILLIAM GIBSON "The marriage of reason and nightmare which has dominated the 20th century has given birth to an ever more ambiguous world. Across the communications landscape move the spectres of sinister technologies and the dreams that money

can buy."

J.G. BALLARD

"program a map to display frequency of data exchange, every thousand megabytes a single pixel on a very large screen. Manhattan and Atlanta burn solid white. Then they start to pulse, the rate of traffic threatening to overload your simulation. Your map is about to go nova. Cool it down. At a hundred million megabytes per second, you begin to make out certain blocks in mid-town Manhartan, outlines of hundred year old industrial parts ringing the core of Atlanta...

WILLIAM GIBSON "Word beget image and image is virus..." WILLIAM S. BURROUGHS

"The library was the American Intelligence's central control network, its memory, what constituted its perception and understanding. (A hypothesis of the political uses of culture). It was called MAINLINE. The perception based on culture as a drug, a necessity for sociopolitical control."

KATHY ACKER

"The soap had been running continuously since before he was born, the plot a multi-headed narrative tapeworm that coiled back in to devour itself every few months, then sprouted new heads hungry for tension and thrust. He could see it writhing in its totality, the way (his mother) could never see it, an elongated spiral of Sense Net DNA, cheap, brittle ectoplasm spun out to uncounted hungry

dreamers." WILLIAM GIBSON

"With your help we can occupy the Reality Studio and retake their universe of Fear Death and Monopoly." WILLIAM S. BURROUGHS

"People jacked in so they could hustle. Put the trodes on and they were out there, all the data in the world stacked up like one big neon city, so you cruise around and have a kind of grip on it, visually anyway, because if you didn't, it was too complicated, trying to find your way to a particular piece of data you needed. Iconics, Gentry called that."

WILLIAM GIBSON "All information is free. All information

is useful." TIMOTHY LEARY

"Science and technology multiply around us. To an increasing extent they dictate the languages in which we speak and think. Either we use those languages or we remain mute."

J. G. BALLARD

"In the hard wind of images. Angle watched the evolution of machine intelligence; stone circles, clocks, steam-driven looms, a clicking brass forest of pawls and escapements, vacuum caught in blown glass, electronic hearth glow through hair-fine filaments, vast arrays of tubes and switches decoding messages encrypted by other machines The fragile, short lived tubes compact themselves into silicon.... Silicon approaches certain

functional limits...." WILLIAM GIBSON

"Philosophy becomes do-it-yourself linguistics. How many neologisms and through-hybrids have you conceived this "How fast are you! How dense!"

month?"

"On the F-16 'AFT-1', for example... MONDO 2000 the pilot never touches the controls but navigates by voice. In return, an onscreen display keeps him informed of his flight plan and 'firing plan', and throws up on the windscreen the anticipated acceleration and countdown time, as well as the kind of manoeuvres that the pilot will have to execute. For the firing operation, the pilot has a special sighting-helmet linked to a laser and infra-red targeting system. All he will do is fix the target and give a verbal instruction for the weapons to be released." PAUL VIRILIO

"There's no there, there. They taught that to children, explaining cyberspace. She remembered a smiling tutor's lecture in the arcology's executive creche, images shifting on a screen; pilots in enormous helmets and clumsy looking gloves, the neuroelectronically primitive 'virtual world' technology linking them more effectively with their planes, pairs of miniature video terminals pumping them a computer-generated flood of combat data, the vibrotactile feedback gloves providing a touch world of studs and triggers... As the technology evolved, the helmets shrank, the video terminals atrophied."

WILLIAM GIBSON "Images - millions of images - That's what I eat - Cyclotron shit - ever try kicking that habit?" WILLIAM S. BURROUGHS

"Kumiko examined the skeletal mattblack tiara. The Maas-Neotek logo was moulded between the temple pieces. She put it on, cold against her skin. She spread the elastic headband and settled the trodes across her temples - one of the world's characteristic human gestures, but one she seldom performed. She tapped the Ono-Sandai's battery test stud. Green for go, she touched the power stud and the bedroom vanished behind a colourless wall of sensory static. Her head filled with a torrent of white sound. Her fingers found a random second stud and was catapulted through the static wall, into a cluttered vastness, the notional void of cyberspace, the bright grid of the matrix ranged around her like an infinite cage." WILLIAM GIBSON



peration VR

Virtual reality will

be more than just

yberpunk is one approach to the potential of VR technology. However, the most radical applications are moored in the real world where work in a nuclear powerhouse, surgery on the battlefield and other hazardous positions will be executed via the technology of VR and telepresence.

One of the key centres of research into computer-based systems in Australia is CITRI – the

Collaborative Information Technology Research
Institute, an ambitious project initiated by
Melbourne University and the Royal Melbourne
Institute of Technology. The centre inaugurated a range of projects into the practical applications of high-end computer systems, intelligent data-bases and interactive multimedia. Mike Gigante, director of the Advanced Computer Graphics Centre, a division of CITRI, believes that VR as a medical tool is an ideal example of the potential of the technology.

Architecture is the VR world mooted most, given its simple geometric structures. However, to make medical applications work in a conventional 'immersive' environment, the present level of technology is, as Gigante says, "pretty much useless". Virtual reality is as yet not real enough for operating on people. Gigante explains: "You might want to augment it (your virtual patient) with information about pulse rates, blood flow, the size of the tumour or where you are with respect to that tumour." The information has to be programmed into the computer before it is useful.

"The closest I've seen," says Gigante, "is from Joseph

fun in the future,
with practical uses
in medicine and
industry and the
potential to 'jack'
sight ability into the
brains of the blind.

Henderson, at Dartmouth College Medical School. He has worked with the US Army on multimedia environments for battlefield surgery. It's a totally emotionally, immersive environment, where you have the noise and strain and people running around in panic, and it emphasises your decision-making skills and response to pressure.

"In the case of a human body, you know where the blood vessels and muscle tissue are, but these are all deformable. Once you cut the skin open with the incision, the system is elastic and moves around a lot, there are blood pools forming... lots of non-geometric simulation that needs to happen. A group at Stanford Medical School have the model of a foot, complete with all muscle and tendon information, so they can say 'if we cut this tendon, where is that load going to be taken up?'

They've augmented the geometry with a lot of simulation information. Their end goal is to have a complete human system there.

"Now if you're an orthopaedic surgeon you want different information than if you're a blood supply doctor — most of the system could be irrelevant to your needs. A better example might be the spine. You have all the nerves and muscles connected to the spine. If you were a physiotherapist, you'd be looking for things that a person who was worried about the nervous system would be uninterested in. So what you'd do for physiotherapists is give them one visual presentation, one simulation of the same part of the body, they might be more happy with an abstract representation, showing connectivity rather than the shape of the nerve structure.



Every expertise group within medicine will want a different model, with different simulations and information."

There are numerous other applications that will be likely to become technologically conceivable in the not-too-distant future, says Gigante citing the example of psychotherapy. "Let's go back to a book written by Roger Zelazney called He who shapes. He talked about a system whereby a therapist would create and manipulate a virtual world in which the person is immersed and manipulated to confront things about themselves. He said: 'Well, we can present that environment to a person who's congenitally blind, who's never seen colour, never seen forests, and try to open their experiences up.' In that case, it backfires.

"That's an extreme case, but you can imagine augmenting people's experience with VR. If you were hospital-bound and stuck in that rather drab environment, VR could provide not just entertainment, but a rich range of experiences that you couldn't otherwise do. I'm not sure how people would react to that. Maybe it would make them more bitter; maybe it would enrich their lives."

The essential difference between VR and any other medium, such as television, is that VR is 'immersive', says Gigante. "You are there, rather than looking at someone else having a good time. So I know if I was immobilised, I would hate television, because I would be looking at other people getting out there and skiing and swimming. Whereas in VR you could actually be there, skiing down the slopes; or you could be driving a car, or you could be swimming."

At present, VR requires a certain amount of visual input from the user. Perhaps one of the most extreme examples of a potential

application would be to give 'virtual sight' to somebody who's blind. "Essentially," says Gigante, "we're talking about non-visual stimulus providing a visual response — a response that we would characterise as visual. The extreme way to look at this is to say we could 'jack' into your brain; create a response in your neural system to make you think you're seeing things. Now, we are so far away from that that it's just implausible at the moment.

"Last year, people actually coupled an individual neuron to a piece of silicon for the first time, and could predictably measure a response from a neuron. But thinking about the complex structure of the human brain... try and imagine where we could actually 'jack' in a complex circuit into millions of these neurons in some organised way.... People just don't understand enough about the brain at the moment.

"There's no evidence, that I'm aware of, that the brain has the ability to re-learn neural structure after the post-foetal, embryonic stage. For example, if you have a brain tumour and you chop out part of your brain, you don't re-grow or re-learn those parts you've lost. So that indicates to me, as a non-neurologist, that the structure of the brain at some point becomes fairly rigid. Therefore, I'm sceptical that even if we do understand the brain at the level required for 'jacking' in, that the brain will be able to make that new connection. For VR or any other technology to directly by-pass the visual system would require that. So I guess I'd speculate: 'Not in our lifetime'."

'Virtual' reality would be an incorrect description in some contexts where the practical 'real world' applications come into



action. "Sometimes you're actually simulating physical reality," says Gigante. "The best example is called telepresence or teleoperation. I might be a worker in a foundry or a nuclear reactor—a dangerous and hazardous environment where I want to be safe and remote. Via VR or telepresence I'm actually in that space, but where I physically can't get hurt but still work in there in detail. So you're actually constructing an artificial version of a real physical thing."

Such realistic commercial applications as telepresence make VR and it's attendant technologies a far more realistic venture, says Gigante. He believes that there are two applications that will succeed in the short term: "The first is entertainment, which will probably be the most important development for the long-term success, in that it will make most of the hardware accessible and less expensive due to large production numbers. The problem at the moment is that the technology is extremely expensive. So the number of research groups or the number of development groups is very small. Make it a mass market item and collectively you have a lot more imagination, resources and intellect being applied."

The other application which should have short to medium term commercial application, is telepresence, especially in hazardous environments. "The only trouble with that is that because the cost per unit is very high, at the moment, you're probably better off paying someone a danger bonus. Via entertainment the cost per unit will come down enough for it to be developed more on a commercial level..."

Prepare to jack in...

A Hacker's Dictionary

CYBERSPACE n. 1. Notional 'information-space' loaded with visual cues and navigable with brain-computer interfaces called *cyberspace decks*, a characteristic prop of cyberpunk science fiction. Efforts to construct virtual reality interfaces modelled explicitly on William Gibson's cyberspace are under way, using more conventional devices such as glove sensors and binocular TV headsets.

E-MAIL n. Electronic mail automatically passed through computer networks and/or via modems over common carrier lines.

HACKER n. 1. A person who enjoys exploring the details of programmable systems and how to stretch their capabilities, as opposed to most users, who prefer to learn only the minimum necessary. 2. One who programs enthusiastically (even obsessively) or who enjoys programming rather than just theorising about programming. 3. A person capable of appreciating hack value. 4. A person who is good at programming quickly. 5. An expert at a particular programme, or one who frequently does work using it or on it; as in 'a UNIX hacker'. 6. [deprecated] A malicious meddler who tries to discover sensitive information by poking around.

It is better to be described as a hacker by others than to describe oneself that way. Hackers consider themselves something of an elite (a meritocracy based on ability), though one to which new members are gladly welcome.

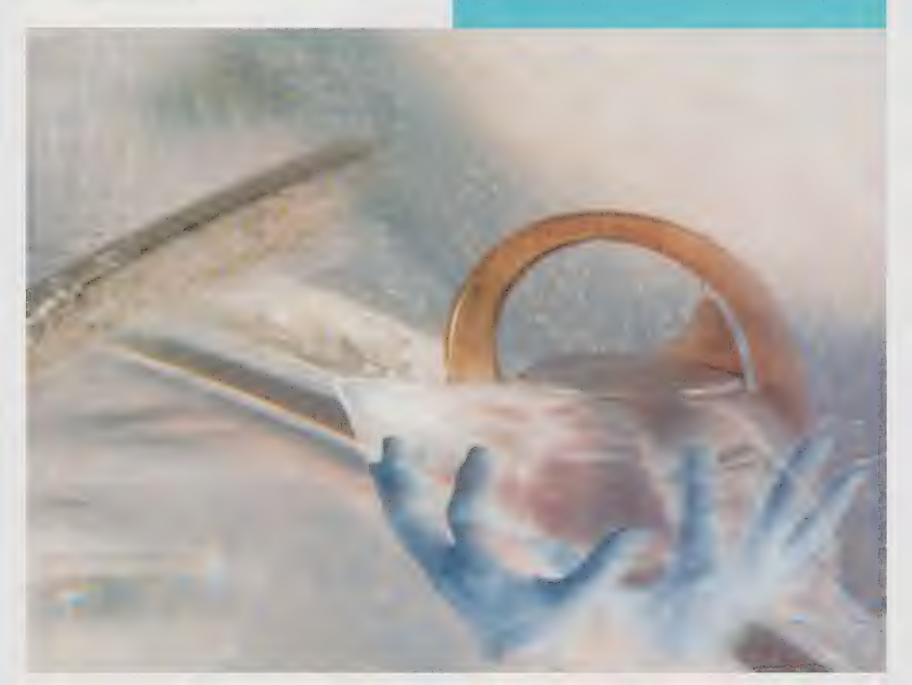
MATRIX n. Fanciful term for a **cyberspace** expected to emerge from current networking experiments. Some people refer to the totality of present networks this way.

NETWORK, THE n. 1. The union of all the major non-commercial, academic and hacker-oriented networks, such as Internet, the old 'networks' plus the corporate in-house networks and commercial time-sharing services (such as CompuServe) that gateway to them.

2. A fictional conspiracy of libertarian and anti-authoritarian hacker-subversives

Often abbreviated to net or described as bang-path.

From The New Hacker's Dictionary edited by Eric Raymond MIT Press, 1991



William Gibson, somewhat to his chagrin, is widely credited as the 'Godfather' of the cyberpunk movement. His books - including Neuromancer and Count Zero - set in a cyberspace dominated future, have had an incalculable influence on the rapidly developing 'chip-driven' subculture. Gibson - pumped up by the 'cyberpunk' subculture to 'visionary' status, alongside such recently refound and bestowed techno-wizards as Timothy Leary - is admittedly

uncomfortable with this. He does not share the gee-whiz excitement about cutting edge computer technology so often articulated by his readers. His writing is more of the hard-boiled detective style of fiction

where characters, despite their technological prowess wander the dark streets of decayed cities. When 21°C interviewed him from his home in Vancouver, British Columbia, his first announcement was, "I'm OK, but my hard disc just crashed, so I'm computerless. I guess I'll take the afternoon off." And spent that time correcting the "founding father of cyberpunk" misnomer.

William Gibson: Actually, I never did come up with the term 'cyberpunk'. I came up with the term cyberspace, but cyberpunk was a journalistic invention. If I'd wanted a term for that, I would have come up with something far cooler and more elegant. 21. C: It must feel at times as though you are standing in a room with a digital reverb unit in it, and that word cyberpunk has been fed into it, repeating again and again. Certainly between such cultish magazines as Mondo 2000 and the recent release of the documentary film Cyberpunk alongside mainstream media hype, from Rolling Stone to Time, the term reiterates ad nauseam.

I think cyberspace is going to outlive it, because it's more useful. It describes something that people know is there, even if they can't see it. Cyberpunk, I don't know myself. It's just there. Although it is useful for describing the intersection of bohemianism and technology, which is always an interesting area.

The fascination with virtual reality that so many people feel now has to be based on the fact that it's new, that it's drastic, that there is something almost supernatural about it. Are we going to get to a stage where as the technology is perfected and becomes cheap, that a virtual reality existence is going to become quite banal?

I don't know exactly what the first broadcast television was, but I

don't imagine we'd find it very interesting, except as some sort of historical artefact. Like, people going to the World Fair in the '30s in Chicago and seeing a little black and white television broadcast from a distance of 15 feet, sort of going into technoshock over that. Then imagine MTV or home video pornography, one of

'Cyberpunk' is useful for describing the intersection of bohemianism and technology, which is always an interesting area.

William Gibson: Streetwise Hi-Tech.

William Gibson's books are proof that science fiction can become science fact. The creator of the term Cyberspace talks to 21°C about typewriters, black & white TV and the effect of technology on society.

> the more evolved forms of the same medium. We see these early forms of technology but we never really have a clue where they are going. It's only the science fiction writers who bother to try and figure out what people might actually do with them.

> So does it follow that if virtual reality becomes banal, an everyday part of everyone's life, is there then anything to fear from it?

> Well, it depends. I mean, television scares me. I don't think we know, I don't think we really understand what television has done to us in my lifetime. I can almost remember a world where it didn't exist. My early memories of television were watching snow on a black and white screen while somebody banged on the front of the thing and tried to get it to work. I can remember when that one was taken out of the box. I don't think we really know at this point. It's impossible for us to realise what it's already done to us. I think that radio and television and virtual reality are all part of the same thing. VR is just another step, and, you know, television doesn't innately have to be wretched, but it so often is.

> I get the feeling that despite the fantastic visions that you conjure up in the books, and the way that's been taken up by an entire subculture, from your own point of view, you don't actually look forward to this high tech with that much unbridled optimism. There are some dangers there? Look at the world we live in today. Depending on what side of the bed you got out on it's either very exciting or it's a sort of flaming distopia just about as bad as anything a science fiction writer could dream up. It depends on your viewpoint on a given day. It's not like technology was some little aspect of life that we could put back in a box and mail back to Japan.

> It's something that influences us in ways that we seldom even imagine. And very strange ways. Who would have known 20 years ago that all those refrigerators cooling people's beer would cause the ozone layer to decay and give skin cancer to penguins? But that

> > really is the way the world works, so I think what I've tried to do is make people aware of their interdependence, I suppose. The question 'Technology: good or bad?' is not an answerable question. If it weren't for technology I might be dead, or paralysed with polio. I

would almost certainly have no teeth. I'd be too near-sighted to find my way to the telephone. All of the things that reverse those possibilities are technology.

It comes down not to the technology itself, but to the application of the technology. A knife can be used to cut cheese, or it can be used to stab somebody.

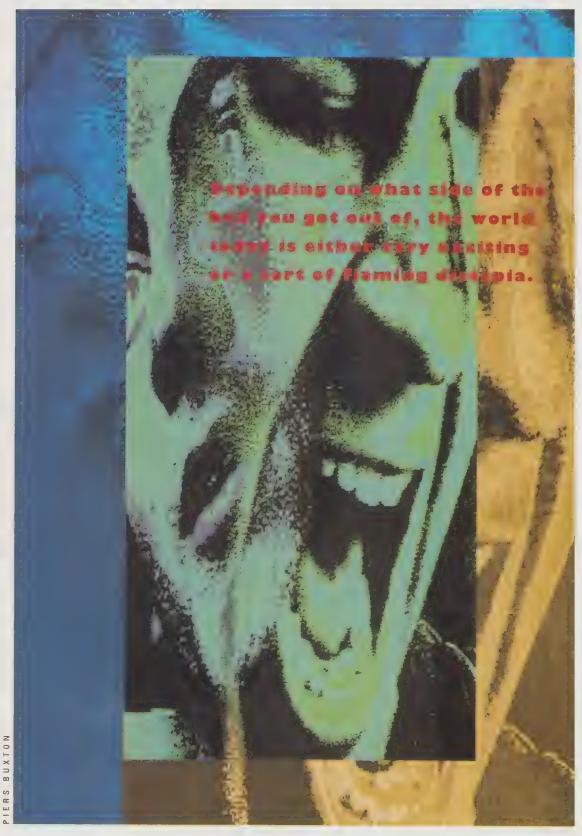
Technologies are very seldom legislated into existence, and still more rarely legislated out of existence. It isn't as though any of this was being planned. The people who are working to realise virtual reality and the people who are working to realise nanotechnology are driven by what-ever weird thing it is that drives them. They're going to change the world, and they are changing the world. That's a very strange situation for all of us to be in. The technology either empowers people or disempowers people, depending on how it's going to be used. With something like VR, is its fundamental basis something that empowers people or is that empowerment going to result from something like the cyberpunk movement, where it almost creates an opposition to itself?

I suppose you could say that the automobile has empowered a lot of people in the course of its career as a happening technology, but look what it's done to the face of the planet. You know, what we're living in now really started sometime back in the early 1800s, when we started developing early forms of the different systems. Assuming we survive, whatever it is we're doing, whatever we're going to be, is not particularly human. Or else it's not going to regard us as being particularly human. In the way that we can't quite imagine what it would be like to be our earlier ancestors. That's not a vision that I've particularly

wanted to explore in my work, but when I think about what the future might actually be in hundreds of years from now, that's really all I can think of. They won't be very much like us, and these things that we're worried about these days will seem very strange. Perhaps the connotations of fear, the things we can look at and fear now, can be overcome simply by bringing the technology more into existence, by making it banal.

The few experiences I've actually had of the equipment, and using the stuff, I'm always impressed by how it is somehow more than the sum of its parts. Somehow it is more than just a couple of television screens and the computer software. It's very interesting in that way, although if you haven't had the experience it's impossible to describe it. It's much more than what you see on a television screen when you're watching a video of somebody using one. It's an odd thing, but it was not very important to me. As a writer I didn't particularly feel that it was central. Dreaming those things up didn't really feel central to my work.

You wrote your first book, Neuromancer, on a manual typewriter, and now you've evidently got a computer, albeit one with a bung hard disc.



That sort of technology upgrade, that basic upgrade for a writer, how has that altered the way in which you write? Has it altered the way in which you think about writing?

That's the insidious thing about it. I suspect that it has, but I'm just not sure. Sometimes I feel that it's just like a power saw. It's like having a power tool and it would be incredibly tedious to have to do it all by hand. And at other times I suspect that it alters the act in some way. With word processing you can do a lot of things to text that you could only do very slowly with a typewriter. I think that's something that people haven't quite appreciated yet. You can take a literary text and sample it. You can do a lot of things that seem parallel to things that you can do digitally with music these days, but it's not something that I've ever seen anyone comment on, but I know I'm very aware of that one. When I work on a computer there are interesting possibilities. William Burroughs' whole business of the cut-up method of writing, and writing as collage on a computer that becomes just second nature. Anyone who uses a word processor does something like that all the time. You don't think about it, so it ceases to seem like a radical proposition.

The 'wired' cities of the future will technologically integrate every aspect of communications and society. But will the cost be an information overload, a loss of freedom and the creation of an information elite? Ashley Crawford reports.

ELECOMMUNICATIONS COMPANIES AROUND THE globe are burrowing beneath the streets to lay down thousands of kilometres of cables, delicate fibre-optic streams, that will allow any conceivable form of communication to travel at the speed of light.

These cables will become the lifeblood of tomor-

row's cities. High-resolution digitalised visual and audio information will come down the wires into homes and offices. Even food will be ordered through the fibre-optic veins of the city. All banking will

plan, information will also be easily accessed by a variety of state organisations – such as tax, immigration and police departments – that will not only link into businesses and homes, but will also be efficiently interlinked. Thus, essentially private transactions – even shopping – will conceivably be accessible to the government system. This is a government that has already outlawed not only smoking on the street but chewing gum.

Singapore may be uniquely structured as a precursor to such a system. With a population of some 2.6 million within a highly developed, compact area of approximately 620 square kilometres, a strong economic record and tight societal control, it is remarkably well placed to establish solid long-term planning.

The government has a history of central planning at the root of all economic policy. The National Computer

ISLANDS IN THE INFO STREAM

be done through the wires. With taxation, immigration, census, research, all linked under ground.

There is nothing fantastical about this scenario. The island city of Singapore, at the forefront of building and planning technologies, will be interlinked by 2005. And when the switch is flicked on, the ramifications will affect almost all aspects of society – from architecture to employment to personal freedom.

In May this year, the Singapore government announced plans to establish a communication network linking every household and office with fibre-optic cables, along with a wire-less communication network that will enable rapid-fire exchange of almost any existing media – film, text or sound – at the tap of a keyboard. With the announcement, the chairman of the State National Computer Board and managing director of the Economic Development Board, Mr Tan Chin Nam, declared, "within 15 years, Singapore will be an intelligent island. It will be among the first countries in the world with an advanced national information infrastructure."

The structure is part of the government's aim to establish its economy on Information Technology (IT). The official *IT 2000* report states that "information is the currency of the new age. Just as gold, silver and other precious metals are regarded as valuable commodities, so now is information."

The report praises the ease of access of information and protection of individual rights, citing authors and artists as, "more fairly compensated as the system will be able to automatically credit royalties every time their materials are copied". The report, however, does not stress that under the

Board's plan for IT was announced in 1986, after more than five years on the drawing board. Since the early '80s, Singapore has developed a massive network of communications media. Fibre-optic submarine cables linking ASEAN countries have been installed and an ISDN infrastructure based on 8,000 kilometres of optical fibre will link all telephone exchanges by 1996.

The sprawling nature of Australia's urban and outback areas may make a 'Singapore scenario' far more difficult to implement on a national scale. Still, a number of projects, established by Telecom, AOTC and other communications organisations, and the potential development of Multi Function Polis-like projects will inevitably lead to the establishment of a high technology, media interaction in this country not dissimilar to Singapore.

David Yencken, professor of Environmental Planning at Melbourne University, predicts radical changes to employment structures as the 'information worker' replaces the blue collar worker. He anticipates a class structure based on information: "I think we're reinforcing an existing class division by the technological change," he says. "It's important to be conscious of this. There should be serious efforts to make sure we don't just rely on the marketplace changes, but that there is an effort to draw others in who are likely to be marginalised."

Although Yencken believes that the networked technology will become as common as the television or VCR, it is "what happens in the meantime" that is of concern, he says. "I'm sure it will be true, as has happened with fax machines, that

the spread of new multimedia systems will be extraordinary. I'm sure that everyone will have these combined systems sooner or later. It's the step *to that* that is the problem, and the social cost in the intervening stage.

"What one can't predict is what will happen in terms of distribution of work and what that might lead to in terms of physical patterns within the city. Clearly, if the nature of work were to change so dramatically that a large proportion of it was carried out in different places, either in the home or somewhere other than the traditional places, then that would have physical impacts. But I don't think you can say that the introduction of the technology on its own does that."

The issue of employment and the information 'rich' and 'poor', however, remains an unsolved issue. Former Science Minister Barry Jones, highlighted this point in the 1991 Report of the House of Representatives Standing Committee for Long Term Strategies. The report, *Australia as an Information Society: Grasping New Paradigms*, stated that already, "the Australian community is divided between the 'information rich' and the 'information poor'. Information facilities are remote from those who need them most. They do not know what is available and do not know how to remedy their lack of information. Some people, perhaps alienated by the complexity of social processes, may choose not to know."

This is a problem likely to be exacerbated by the costs of 'wiring' over large distances. Even the underwater fibre-optic ASEAN linkages pale into comparison next to 'wiring' an entire country such as Australia. With its many outlying communities and large tracts of desert and bush, it is a task comparable to the laying down of the vast railway tracks of the 19th century; but technologically far more difficult and expensive.

The report also acknowledges the problems of privacy presented by the Singapore model. "The risks posed by this development threaten individuals and the nation as a whole," the report warns.

Peter Poole, professor of Computer Science and assistant vice chancellor of Information Technology at Melbourne University, argues that while information availability is inevitable, its spread could be controlled through suitable regulations. "The government already has vast amounts of information," says Poole. "In fact, the government needs vast amounts of information in order to do its planning, particularly in an environment which is as technologically complex as our own. I'm fairly comfortable with that information being available providing there are regulatory mechanisms. Our society exists at the moment because there is a balance between various components - government, the legal system and so on. We wouldn't be doing ourselves a service to turn around and say this information can't be made available to those who have a need to know. So, providing you have the right kind of regulatory system set up, why not?"

Others are not so optimistic. In 1988 Gareth Evans, then Minister for Transport and Communications, said: "The



FIBRE-OPTIC EDUCATION

Professor Peter Poole maintains a leading role in Australia's Information Technology development. Wearing the dual hats of vice-chancellor of Information Technology and professor of Computer Science at the University of Melbourne and chief executive officer of the Collaborative Information Technology Research Institute (CITRI), Poole is remarkably well placed to consider the consequences of, not only his own work in this field, but that of Australia's largest research units.

Let us start with the wiring of Melbourne University...

We have, as part of Melbourne University's Information Technology Strategic Plan, built one of the most advanced networks in academic communities, certainly in Australia, and it's right up there on a par with the best in the world. We have fibre-optic all over the campus. All buildings are interconnected and we have something like 5,000 computers connected to that network of varying makes and manufacture, and they can all communicate.

So it is going to change the way in which we will educate in the future, and hopefully we will improve the quality in that education. I see a future in which there are fewer lectures, but more tutorials and many of those tutorials will be interactive with machines.



I see a future in which there are fewer lectures, but more tutorials — many of those tutorials will be interactive with machines.

Does this mean the student population will work from home more?

Yes. When we drew up the plan in '89 we considered a model where there is a fibre-optic link into every home. The capacity that that will have enabled us, is to envisage a situation where students stay at home and search the libraries of the world over the network; they can talk to each other, they can talk to their lecturers, they can whistle up videos of well-known sociologists and so on. We quickly rejected that as the full scenario. People are people and need to interact, not just on machines. So we still see students coming to the campus – it's the human aspect which is just as important as the knowledge aspect.

Is what you have created here potentially a microcosm of society as a whole?

Absolutely. In the society of the future education will never cease. The rate of change is increasing. We will spend greater time on

education throughout our lives and a lot of that, I believe, will be done through intelligent work-stations connected to a global network. Here we're linked into ARNET which links all the universities in Australia and we also manage the link to the US which in turn links us into the rest of the world. Similarly there is FREENET, which doesn't require fibre-optic, just a telephone link. Just as every home has a telephone and a television, I think ultimately every home will have a computer and access to such communications systems. I hope Pay TV comes through fibre-optic rather than satellite because then you could have all of these services going into the home, but you could also have the home reaching out for its amusement, information and work.

Do you see a danger in the divide between the information 'rich' and the information 'poor' and the issue of employment arising from this situation?

We're seeing that now. There's not much demand out there for muscles. But most people are capable of lifting their level of education providing the right level of educational services are provided to them. There are great arguments amongst the sociologists that if you're born into a 'lower income' home it is very hard to rise above it because there isn't that support structure at home which encourages you to get out and learn. But, with the ability to bring large amounts of information into the home, it would give people enormous opportunities.

Even things like books and videos, when you've got a really high band-width, you can envisage situations where you can peruse the titles, choose one and, *zap*, it comes down the line in digital form – it won't be a video *tape* any more, it will simply be a digital image of that particular film.

Will people still enjoy the simple tangibility of owning a book collection, despite the accessibility of the information inside a book or a CD?

You'll be able to arrange to have it transmitted. You still buy it, but you can envisage that all of those books or CDs that you have purchased are simply stored in your machine. Remember, once upon a time, people looked at a book as a work of art on which you laboured for the whole of your life illuminating and it was a treasured possession which was not available to the masses. The illuminators were horrified when those books suddenly became a mass product with the invention of printing. You and I have grown up and had a lot of pleasure from books, and because we have had pleasure from books, we also associate that pleasure with the touch and the smell and so on of books. But I have also had an enormous amount of pleasure from computers. Let me just paint a picture that I believe is technologically possible, an idea first put forward in the early '80s by Alan Kay from Apple. The book, when it first came out didn't contain any more information than their predecessors, the illuminated books. But what they did provide was accessibility. But a computerised equivalent is not one book, but a thousand books in one module which you can discard and add. And then you start talking about Hypertext, so the books can all be linked and cross referenced. One of the big projects at CITRI is Hypertext. So now suddenly we have something far superior.

My friends say, the book *feels* good and *smells* good. But that is only because you've been conditioned to react positively to something that gives you pleasure. But I claim that this accessibility will give you *more* pleasure.

■ INTERVIEW BY ASHLEY CRAWFORD

(Continued from page 66) convergence of rapidly improving computer and telecommunication technologies is having a profound impact upon almost all social institutions.

"This is the process of convergence, the merging of the once discrete technologies of telecommunications, computing and increasingly broadcasting. The interlinking of these technologies and the industries which produce and use them has led to the creating of a wide range of new products and processes, creating major adjustment challenges for the IT industry itself and for the users of IT goods and services.

"The significance of this convergence for governments and regulatory bodies is that it erodes the distinctions between telecommunications and other services; blurs the boundaries between industries; and makes the traditional telecommunications regulatory framework increasingly difficult to maintain."

Three years later, the Long Term Strategies report echoed Evans' sentiments, and considered the potential for an allencompassing Communications Act covering all media including the Telecommunications Act, the Australian Broadcasting Corporation, the Satellite Communications, Broadcasting and Radio communications Acts. This proposed 'Information' Act would cover everything from faxes and phone calls through to pornographic movies and computer access to the works of Shakespeare.

It is an issue which Henry Geller, a communications fellow with the US Markle Foundation, argues in the recently released Australia's Communication Futures. Says Geller: "Australia would be well advised with a centralised authority, not to go forward with cable television as a separate entity. A better way would be to have the telephone company take over the task of wiring the nation."

The division, however, between the issues and the solutions remains vast. Those issues are well encapsulated in the plans and IT ambitions of the Singapore government.

• SMART BUILDINGS

As the emphasis turns towards communications technology, the structure and architecture of new buildings are evolving to integrate the necessary 'software'. Such intelligent buildings combine integrated systems for building services (lifts, energy, security and emergency services) and telecommunication services (information collection, teleconferencing). Thus, as Yencken points out, office buildings in the future need to be seen not only as the accommodators of office workers, but resources for transmitting and receiving information.

Interestingly, existing patterns in Japan or the US, suggest that the telecommunication infrastructures are, rather than encouraging decentralisation – as predictions of home offices suggested – tending to increase the concentration of the functions of multi-national headquarters in the larger cities. Depending on the scale and size of the city, IT has led to a definite centralisation of technological functions. Professor Kevin O'Connor, lecturer in Urban Geography at Monash University, believes there is a simple explanation for the centralisation of functions as a result of IT.

"IT has opened up an area of tougher questions and uncertainty which have resulted in non-routine types of discussion and analysis. This then forces people to meet in a central, accessible location, being the city, so as to communicate ideas and solve problems and issues."

This is well illustrated by Kawasaki, an inner industrial suburb of Tokyo with a population of 1.2 million, where the local government is working to establish an 'information city' in the form of 18 'intelligent plazas' – constellations of 'smart' buildings all intensively and invisibly wired via a 30 kilometre 'spine' of optical-fibre cable linking over 100 high-tech industries.

A number of 'intelligent cities' are well established in other parts of the world such as the La Villette Technology Park outside Paris and the Tsukuba 'Scientopolis-technopolis' near Tokyo. Projects like these are not inconceivable in cities like Melbourne or Sydney. Indeed, cities with established international trade links are those most likely to benefit from the earlier installation of networks. Although it is the construction of a new Multi Function Polis (MFP) that would provide the fastest track for the installation of an information network.

The much discussed and debated MFP was first put forward by the Japanese Ministry for International Trade and Industry (MITI) in January, 1987, with the theory of utilising the sophistication and dynamism of Japan's high-tech capitalism alongside the open spaces and geographical appeal of Australia. It is, perhaps, not surprising that the project inspired an essentially paranoid response in many Australians; terminology in major MFP documents was less than user-friendly, describing the project alternatively as an "incubator", "testbed" or the "site of intra-industry agglomeration rather than cross-industry synergy".

The paranoia extended to the actual role which Australian workers were to play in the context of the MFP – 'glorified caddies?' asked some Australians, taking a swipe at the Japanese penchant for golf and the perception of Australia as little more than a fairway for resources and real estate.

"The Multi-Function Polis got off to such a horrific start because it was so mangled by those running it," Yencken points out. "It was doomed before the project could be discussed properly. There was this obsession about using this as a springboard for bringing about certain kinds of technological change in Australia and, because of that, suggesting that the social issues weren't important. From that grew a kind of conspiracy theory and it wasn't used in a very productive way – to ask questions about the direction of society."

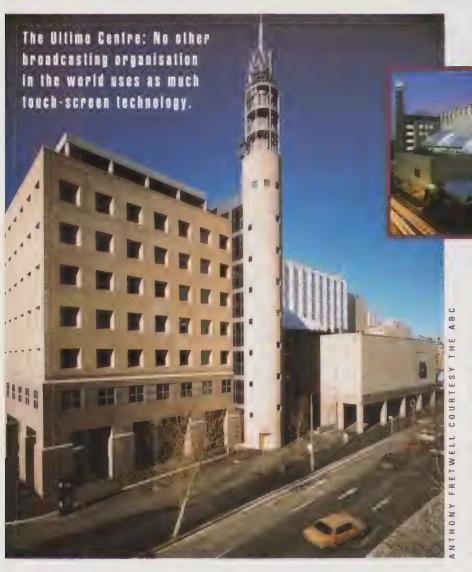
But, the MFP, with its promise of sophisticated technologies, was only the first step towards a very real scenario already underway in Australia's major cities. A social divide is appearing between the 'technologically literate' well employed, and the traditional trades and blue collar workers. The latter group are being cast into a form of employment limbo.

There can be little doubt that the notion of an 'information rich', but essentially centralised form of communications technology, will be heading into every major capital city of the world before the year 2000. Initial attempts, such as the

French Minitel system, have met with only partial success; with subscribers largely rejecting the system because of cost, although making the most of its communications and entertainment potential.

But the 'wired cities' of the near future raise immense problems in the nature of current society. If a city such as Sydney takes the almost inevitable step and becomes a sophisticated information receiver and disseminator, it will add to the potential of Australia developing into an information economy. It will also earn itself a place as a 'global city' within the Asian region. Where does this, however, leave those outside that 'info-net'? Who will control the mass of information pulsing through the wires – information that will be accessible to some... but not to all?

With reporting from Linda Gregoriou



ABC/HQ: BUILDING BLOCKS FOR AN INTELLIGENT CITY

THE FORM AND STRUCTURE OF A 'WIRED BUILDING' ARE exemplified by the purpose-built ABC Ultimo Centre which heralds a new era for the Australian Broadcasting Corporation. The state-of-the-art complex which now

replaces two buildings formerly occupied by the Corporation has been designed to equip ABC radio and

orchestral staff for the challenges of the next century. Major international broadcasters such as the BBC are looking to the new technologies and work practices as significant models for their own forward planning.

The architectural features of this build-

ing create a versatile work space for the complex and integrated functions of the organisation. The central space has been designed as an 'internal sheet', which opens the building to the public. From this space all nine levels of the building can be seen, rather like looking into the internal workings of a piece of high-tech machinery. Designed as the most advanced acoustic space in the southern hemisphere, the Eugene Goosens Hall is primarily used as a rehearsal and recording space. The hall effectively consists of two huge concrete boxes one resting within the other on rubber mats. The inner cube weighs 4,800 tonnes and the outer cube 5,600 tonnes.

The technology and resources housed within the centre include such innovative features as the 'touch screen' consoles, eliminating the former mechanical faders, so presenters can merely touch the screen to control volume, microphone, compact disc players and so on. No other broadcasting organisation in the world uses as much advanced touch-screen technology as the ABC in this new centre.

Linda Gregoriou

ARCHITECTS OF

In the early decades of this century, visions for a city of the future had strong links with utopian ideals and Modernist social and artistic thought. This period produced a spate of powerful architectural visions: from Tony Garnier's Industrial City BYPETER in 1910 to Italian Futurist and Russian

Constructivist graphic dreams to the Frenchman Le Corbusier's more comprehensively planned and devastating models. In all of these the idea of a new technology, of the Zeitgeist, was an essential if not the driving force. Today, that tradition of the high-tech aesthetic continues in Australia.

Modern technology was to be the great egalitarian equaliser. Within these visions, however, the Italian Futurists in the 1920s hinted at something slightly darker. There was a sense of addiction or obsession with technology; the technology had its own force and intent rather than mutely serving the heroic intentions of its creators.

In Canberra, we currently have a model for the intelligent city of the 21st century; but in a sense we are still awed by the technology. The National Parliament House is a secure, hermetic, air-condi-

tioned polis in which many eat, sleep, work and play, free

from external interference or community contact.

Politicians sit isolated by wide buffer zones of neu-

tralised, climate-controlled space. Physical contact is all

public further towards the periphery. There is a sense that the beating, decision-making, heart of the nation is not the collective of politcians, who are left stranded in their luxurious offices, but the building itself;

now making an ominous contribution to CORRIGAN the governing of Australia. Mr Keating's

rise to Prime Ministership was aided by Mr Hawke's problems in counting heads in the new sterile and endless corridors of power.

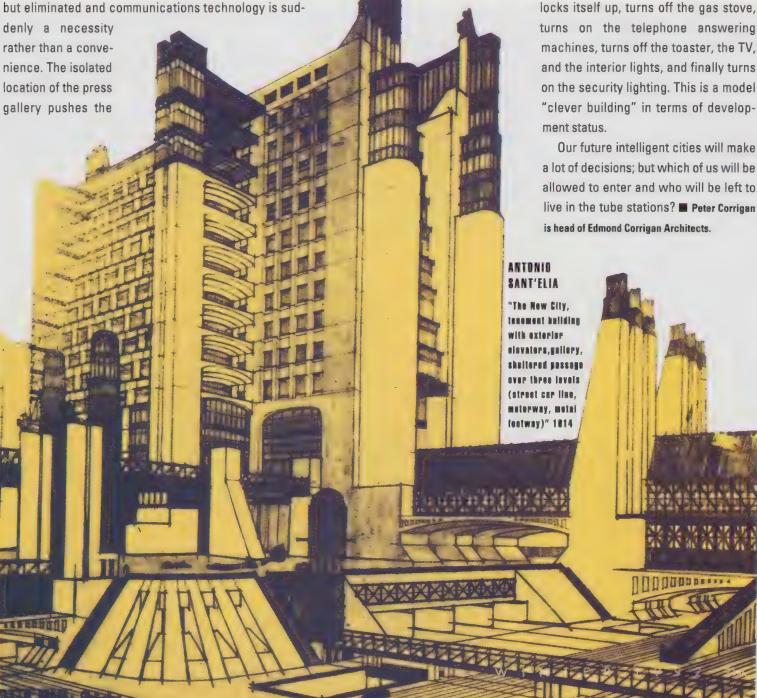
"Intelligent" buildings are often simply compartments of highly serviced, environmentally neutral space; with tinted windows, designer lighting, talking elevators, variable-volume air conditioning, central monitoring computers, fibre-optic communication networks, key card security and ergonomic furniture. At home the fantasy world of electronic entertainment and instant replay continues this erosion of awareness of our potential human, real sensual, experience.

Artificial intelligence in cities is now a technology that is separate from its human creators. An essential interest for the intelligent-city dweller will be, if the lately touted communication revolution is anything to go by, in what direction the new technology will force decision-making? What values will emerge?

> My office is presently building a series of fire stations for the Melbourne Fire Brigade. These buildings are designed such that when the fire truck leaves on call, the station

> > locks itself up, turns off the gas stove, machines, turns off the toaster, the TV, and the interior lights, and finally turns on the security lighting. This is a model "clever building" in terms of develop-

> > Our future intelligent cities will make a lot of decisions; but which of us will be allowed to enter and who will be left to live in the tube stations?
> > Peter Corrigan



As in Los Angeles, Australia faces the spectre of a deeply divided society in which unemployment, inequality, crime and violence are destined to grow and feed off one another.





BECOMING ONE OF THE HAVES

SPARKED BY INEQUALITY, IGNITED BY INJUSTICE, LOS ANGELES, APRIL 1992



Gib Wettenhall considers the growing division between the employed and the jobless. Is the work ethic, he asks, a contradiction in terms?

NE GENERATION AGO 10 PER CENT UNEMPLOYMENT was considered intolerable. Today, no matter the political persuasions, all predictions are based on that statistic as an accepted minimum. The hardest hit are the young. Almost 200,000 young Australians are putting on their best clothes and brightest smile,

chasing jobs that are not there. If current policies prevail, many of them can expect to join the swelling hard core – now 43,800 – who have searched to no avail for more than a year. Australia is in the process of creating a permanent rump of young unemployed.

"Young people are the major single victim of the current recession," says Richard Sweet, the research co-ordinator at the Dusseldorf Skills Forum. According to Sweet, over half the jobs that disappeared last year were lost by teenagers. Just one generation ago, in the socially turbulent mid-1960s, only 2 per cent of the nation's youth were unemployed. Now the figure is approaching 40 per cent, and climbing. As in Los Angeles, we are staring at the spectre of a deeply divided society in which unemployment and inequality, crime and violence are likely to grow and feed off one another.

The building blocks of society

Over the last decade, economic opinion has shifted from the view that inflation and unemployment should be tackled together, to a belief that inflation is the prime economic target. At the policy-making level, this has led to an acceptance that, irrespective of the levels of economic growth, unemployment will remain around 10 per cent for the next few years. Even our universities, known for idealism rather than election-eering, predict gloomy forecasts on the job front. "There is not now any chance of avoiding this situation," according to a recent paper, 'Long Term Unemployment: Projections and Policy', prepared by the Australian National University.

Labor's 'One Nation' strategy and the Liberal's 'Fightback' package both accept high rates of unemployment well into the future. At best, Fightback promises a long-term goal of 5.3 per cent unemployment by the year 2000, while One Nation looks to a one-quarter fall in unemployment to 9 per cent by 1995. "This will still mean over 200,000 unemployed for 12 months," says John Wiseman, the president of the Victorian Council of Social Services. "It will still mean over 1.5 million Australians dependent on unemployment benefits."

Youth, it would appear, has been sacrificed in the name of economic restructuring. As Robin Hartley, a research fellow at the Australian Institute of Family Studies, pointedly asks, "What does this mean in terms of our future when young people are the building blocks of society?". The heads of Australia's leading welfare bodies, Bishop Michael Challen from the Brotherhood of St Laurence and Garth Nowland-Foreman, the director of the Australian Council of Social Services, believe there is an urgent task to stimulate an extensive and informed public debate about the future of paid and unpaid work in Australia.

"If full employment is desirable and achievable tell us why and how," writes John Wiseman in an as yet unpublished paper titled 'Towards or

Beyond Full Employment?'. "If it is not then we had better begin to talk about other ways forward."

Moral priority

During periods of rapid change, one of the most unfortunate spin-offs is the resulting alienation of large sectors of society because of instability and insecurity. Indicators of crime and violence increasingly point towards modern youth's apathy towards and disjuncture with our rapidly changing society.

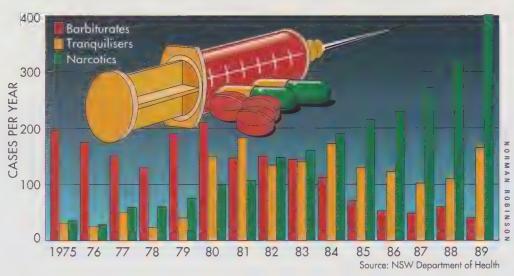
The young are particularly vulnerable. "They face the difficult metamorphosis from child into adult, deciding who they are and what they believe, and accepting responsibility for their own lives," says Richard Eckersley, a principal issue analyst with CSIRO until 1990, and author of a Commission for the Future report on the social and psychological problems faced by young people in Australia. "It is a transition best made in an environment that offers stability, security and some measure of certainty."

of the modern industrial world, shows many signs of a society falling apart," Eckersley claims.

As was all too clear from the scenes of rampaging and looting in Los Angeles, crime in Western societies has become the main activity of not only the underprivileged but, more particularly, the young. Crime rates have risen sharply in most, if not all, Western societies since World War II, after a long decline from the high levels of the early 1800s, during the Industrial Revolution. Eckersley points out that in Australia over the past 15 years, the rate of reported serious assault has risen five-fold, reported rape has trebled and reported robbery (theft with violence or the threat of violence) has more than doubled. The incidence of non-violent crimes has also doubled. Only the murder rate has not changed significantly over this recent period.

In both the U.S. and Australia, the sense of gloom preceded the current economic recessions, Eckersley argues – although recession has deepened the pessimism. According

MAJOR DRUG TYPES DETECTED IN POST MORTEM CASES - NSW



the theme that the shallow, materialist nature of Western civilisation lies at the very heart of the despair today's youth have for their future.

Refining this initial study, Eckersley has been examining the spiritual and cultural malaise that, he believes, is the underlying cause behind such problems as high suicide rates, drug overdoses and violent crimes among young people. In the yet to be published paper, Eckersley canvasses the theme that the shallow, materialist nature of Western civilisation lies at the very heart of the despair today's youth have for their future. In this controversial critique, Eckersley breaks with the prevailing view among social scientists and other commentators who believe that such factors as family breakdowns, education pressures, homelessness and unemployment remain the prime cause of the alienation of youth from modern society. Eckersley goes deeper, examining the very cultural foundations of our society, demanding a fundamental rethinking of Western values and our philosophical orientation.

Western civilisation in the 1990s is in cultural turmoil, Eckersley asserts. Compared to the problems faced by Eastern Europe and the former Soviet Union, the flaws in Western societies, although not as obvious, will be just as profound in their effect. "The United States, the pace-setter

to a new major study, the status of American children has declined over the past three decades on almost every score except infant mortality: children today are fatter, more suicidal, more homicidal, and score lower on educational tests than the children of the 1960s.

"Although the symptoms may not be as severe, Australians are suffering a similar malaise," says Eckersley. "Recent surveys reveal a people who, beneath a professed personal optimism, nonchalance and hedonism, are fearful, pessimistic, bewildered, cynical and insecure. They are deeply alienated from the country's major institutions, especially government, believing Australia has no national goal or vision and therefore no sense of direction or purpose."

Again, the flaws show up most clearly in the youth culture, Eckersley claims. A 1989 study by Mackay Research, called 'Young Australians', found a youth culture that is only barely meeting the needs of its members in terms of providing them with meaning and an identity. Young people are increasingly not participating in society as a whole, let alone effectively participating in working life.

"The growing crisis facing Western societies is rooted in

our values," says Eckersley. "In the moral priority we give to the individual over the community, to rights over responsibilities, the present over the future (and the past), the ephemeral over the enduring, the material over the spiritual.... We are left with nothing more than ourselves to believe in, and for most people that is not enough."

Them and Us

Technology takes centre stage in any discussion about the future of work whether you are an optimist or a pessimist, argues Dr Belinda Probert, senior research fellow at the Centre for International Research on Communication and Information Technologies (CIRCIT).

Best-selling author, Alvin Toffler, celebrates technology's role in "the death of industrialism and the rise of a new civilisation". Riding on the back of technology the 'Third Wave' will bring with it "methods of production that make most factory assembly lines obsolete". Unpleasant and unskilled jobs will disappear. In their place, the post-industrial trinity of computers, satellite telecommunications and fax machines will give rise to the 'electronic cottage'. In a wide range of occupations – from architects to insurance clerks – men and women will work together from home, transforming human relations, creating a more sharing and caring world.

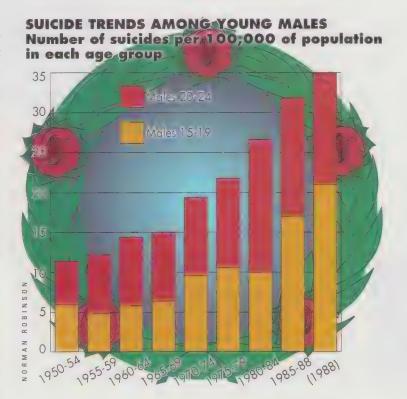
Pessimists agree that machines are replacing workers on the factory floor, but they contend that technology is the chief agent restructuring all workplaces, replacing low skilled workers from not only the assembly line, but also in many kinds of service jobs in areas as diverse as banking, insurance, retailing, mail delivery and fuel supply.

Dr Probert thinks that one of the most interesting features of the whole debate about the future of work is the silence over the direction technology is taking in the workplace. Yet estimates are that the restructuring of industry and changes in work practices have been responsible for two-thirds of the jobs lost since 1989, and those jobs will not be replaced. She believes the unions have "gone quiet" on the issue because technological change is the motive force behind award restructuring: job losses are traded by the unions for skills upgrading and higher pay.

This silence could, however, prove short-sighted as services and manufacturing industries become totally automated. Dr Probert cites the example of postal services. In some parts of Canada, there are no longer door to door postal deliveries on new housing estates. You pick up your mail from the shop at the end of the street. In the post office itself, scanning machines are replacing people. With this process already underway in Australia, award restructuring for Australia Post could end up benefiting very few people.

Dr Probert believes that we should not accept what is happening through technological change as some sort of "neutral process driven by scientific progress or an abstract concern with efficiency." Like Eckersley, she says we need to look to the underlying economic, social and political relations that provide the context within which technology operates. For instance, both the optimists and pessimists accept that in a technologically advanced society unskilled jobs largely disappear.

Optimists like Toffler blithely assume that while a few highly skilled people work hard for the good of society, the only worry for the rest of us will be what to do with *our* leisure time. Such a scenario, however, contradicts past human behaviour – in Western societies, at least. Neither redistribution of jobs, let alone income, has shown any tendency towards equilibrium across the population. As a case in point, consider the figures mentioned at the beginning of this article on what has happened to young people as a result of job restructuring. A more likely scenario is for a 'them' and 'us' society to arise, polarised between the few with complex jobs and high levels of training and the vast majority who are doomed never to find paid work at all.



As another example, the reality of social relations between men and women are making Toffler's glib assumptions about the cosy electronic cottage seem laughable. Similar to traditional forms of home-based outwork from sewing clothes to producing 'home cooked' foods for the local gourmet deli, much high-tech homeworking is targeted at women caring for young children at home. Such homework thereby reinforces the traditional distinction between men and women's work. It begins from the stereotyped premise, Dr Probert argues, that the primary identity of the women who are targeted is as a "mother and wife rather than as a worker, and as a result she is expected to tolerate low wages and the absence of career prospects".

Dr Probert concludes that "it is not technology as such which holds the key to the future of work. It is the economic, social and political system which determines whether corporate interests are to prevail over employees' interests, and whether men's interests are to prevail over women's, and whether the unemployed are to be allowed to have any

interests at all." From this perspective we can begin debating such fundamental issues as what type of jobs we want in the future; whether there is a responsibility to provide for a guaranteed minimum income; and how we redefine the concepts of career and motherhood so the two are more compatible?

Everyone has the right to work?

Work is not simply a means of earning a living or defining a person's status in the community. Robin Hartley believes that research carried out by the Australian Institute of Family Studies demonstrates that for young people work acts as a bridge to adulthood. Richard Sweet thought it was generally well understood that "democratic participation in working life makes for a good citizen". In other words, at the deepest socio-cultural level, the degree of complexity of a person's work and their level of involvement in decision-making determines to what degree that person is capable of engaging in a society.

Such conclusions have profound implications for how we define work in a future where the achievement of full employment – in the traditional sense – may be neither possible nor desirable.

'Everyone has the right to work' the United Nations' Universal Declaration of Human Rights chants, but as Charles Handy, a professor at the London Business School argued in his book *The Future of Work*, "no country can



Young people are increasingly finding ways of redefining their work so they can express their creativity.

deliver on that promise any more". He asks: "Can 'work' therefore mean more than a 'job', or must we start rationing work as if it was some scarce commodity?"

As Handy points out, the whole concept of rationing work is, to use his word, "crazy". Work has been defined as problem-solving. There are more than enough problems in the world. If only we had the means to harness human energy and creativity to solve all that needs to be done in the world. As to the desirability of full employment in its traditional sense of everyone having a "job", John Wiseman poses such questions as: "Is the economic growth required to generate new jobs on a massive scale compatible with ecological sustainability? Would full employment do anything to fundamentally challenge existing inequalities – including those between workers in paid employment and workers carrying out unpaid work at home?"

Would we as a society be better off trying to reduce the time spent in paid work, and instead concentrate on ways of opening up people's time and talents to pursue creative interests? As Louise Crossley discussed in the most idealised of her four future work scenarios in *Children and the Future of Work*: "Employment, in a paid capacity, would not be the only recognised form of work. Instead, work would encompass many kinds of self-organised activity or 'ownwork', which would become an increasingly central focus of interest and of individual and community production."

Adding intellectual value

There are so many variables affecting the future of youth and their participation in the work-force it would be foolish to attempt to predict what might happen in the 21st century. What we can do, however, is attempt to reach for a preferred future. Through articulating the outlines of a preferred future, we make it possible to achieve it.

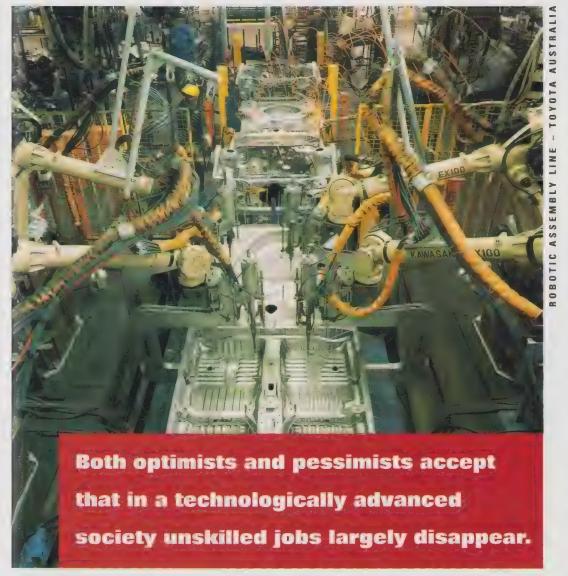
While the 'wage' is still central to one's well-being and life chances, Robin Hartley says research has shown that "most people give overriding importance to the family over work". Moreover, young people are increasingly finding ways of redefining their work so they can express their creativity. Human beings seem to have an innate need to express themselves through activity of some sort, whether it is through street theatre, voluntary community action or gang warfare. "What we need are wider options of valuing people," says Hartley. She believes that instead of making a job central to a person's life, we need to look at a guaranteed minimum income scheme that offers the basic means of survival for all.

There is likely to be far more part-time work in the future. Dr Probert believes that rather than calling for the traditional goal of full employment, we should be transforming the concept of normal work through, for instance, the reduction of working hours per day; so that to quote German feminist, Gisela Erler, it allows women "to combine their reproductive and job identities in a new mix".

How do we get men to take up caring roles, Dr Probert asks? "Doing caring work is good for you – good for all of us." More time at home and in the community creates "tremendous opportunities. New information and communication technologies create the potential for radically reorganising the location of employment to meet both environmental and social goals – of reducing travel, and bringing the home, the school and the workplace closer together."

A widespread concern was expressed over ensuring that any future work is not only environmentally sustainable, but also the fruits of whatever labour exists are equitably spread throughout the population. They would agree with the Dalai Lama's call for humanity to adopt more compassionate, non-violent and environmentally oriented values.

John Wiseman believes we are confronted with "the task of imagining what kinds of economic goals are compatible with the wider values of environmental sustainability and social justice. The historical evidence does not inspire confidence in solutions based on level playing fields and deregulated free markets," he argues. "We need new mechanisms to mobilise savings and to direct them to investments which



generate employment and meet environmental goals."

Richard Sweet looks to building on the potential of our natural resources through adding what he describes as "intellectual value" – a process that has taken place in all the world's successful economies, big or small. He gives the example of Finland.

"The Fins have two natural resources – timber and people. They've been smart enough to use one to develop the other. Basically, the Fins have said, what can we do with timber other than chop it down and export it in its raw state?" Their answer has been to build up a substantial manufacturing base through adding 'intellectual value' to their timber products by the design and construction of superb furniture.

Sweet's employer, the Dusseldorf Skills Forum has single-mindedly dedicated itself to spreading the message that the future of work lies in greater skilling of young people through better linkage between the workplace and the education system, making the latter far more vocationally oriented. Apart from New Zealand, Australia has the smallest vocational preparation system among OECD countries for bridging the gap between school and work.

"All successful economies treat the preparation of young people for work as a serious economic issue," claims G.J. Dusseldorf, who was the founder and chairman of the Lend Lease group of companies for almost 40 years. Since 1989,

he has chaired the Dusseldorf Skills Forum that was funded by Lend Lease employees and shareholders on his retirement. How can we learn to do work, not just learn about it?" he rhetorically asked in his Copland Memorial Address last year. "How can we develop competence and recognise it? These are the issues that will determine our economic future."

Richard Eckersley's way forward includes increasing the level of science education at school, so the adults of the future have a better understanding of how best to use the potential of science and technology for the benefit of the planet and particularly the human species. As a means of combating the increasing alienation of youth, he, too, believes in the need to "integrate and reconcile economic, social and environmental objectives".

In his 1989 report for CSIRO Regreening Australia: the environmental, economic and social benefits of reforestation, Eckersley argued the case for a massive long-term national environmental restoration program, based around, but not restricted to, large scale

reforestation and revegetation. Besides creating many socially useful and personally worthwhile jobs, Eckersley argued that such a broader program could promote "a greater sense of national confidence and purpose and a greater sense of belonging to our land and responsibility for its care. In this sense you could argue that there is even a spiritual dimension to the program." The case put by Eckersley caught the imagination of the Federal Government to such an extent that as a direct result the then Prime Minister, Bob Hawke, launched the One Billion Trees Program – as good an example as any of the social and political merging to effect environmental change.

On the outer edges, there are even those who are looking beyond full employment to a new world order based on sustainable development and a more equitable distribution of resources. "Now is the time for debate on the ways of shifting the world's priorities and redirecting the current \$1 trillion a year spent on weapons towards investments in the areas of health, education and environmental restoration," argues influential American futurist, Hazel Henderson. With the collapse of the Cold War, perhaps it's time we started looking at how we could divert the mighty array of resources at the disposal of war and destruction towards peace and reconstruction. Gib Wettenhall's last story for 21 °C was 'Sustaining the Madding Crowd', on the problems accompanying Australia's population growth.



rick or reaties?

Is a Treaty
between colonised
and colonisers the
latest example of
appeasing natives
with beads? Andrew
Masterson considers
the plights of those
indigenous people
striving for identity,
self-determination
and a fair go.

IT IS TEMPTING SOMETIMES, WHEN WEARY OF THE SOBER AND CONSCIOUSLY rational dissertations on the rights and wrongs of colonial settlement, to throw one's arms up in frustration and yell that the central problem of this world is that it contains Anglo-Saxons. Tempting, yes, but unwise and insupportable in its broadest form, since it ignores the colonial contributions of many other nations, such as the Dutch, Spanish, French, Portuguese, Russians and Chinese. The latter highlighted in this country by the recent visit of Tibet's spiritual leader the Dalai Lama. However, when viewing the massive problems and depredations suffered by indigenous people in many parts of the globe, it is entirely reasonable (if utopian) to state that the situation would never have arisen had the Anglo-Saxons remained in Kent milking cows instead of seeking military and mercantile advantage. In March this year, the Australian Museum hosted a remarkable conference designed to canvass options available to Kooris for achieving sovereignty. It was called The Future of Australia's Dreaming. One of the keynote speakers was Ms Dalee Sambo, an award winning, human rights activist and member of the Inuit people who live in Alaska and the Aleutian chain. In her closing remarks to the conference she made the not altogether flippant

comment that perhaps a similar conference organised for and by the colonists, as distinct from the colonised, might be a good idea. "I've always thought that in the United States it would be really fun to pull together a conference that focused upon the history of white people in America," she said. "It would be interesting for Aboriginal anthropologists and others to hold a conference on



Bob Wetherall of the Tasmanian Aboriginal Centre, protests outside a London museum against refusal to return ancestors' bones.

the history of white people in Australia and their cultural disorientation, and how disconnected they are to the environment that they live in, and what their problems are, what their perceptions are. Who knows, maybe we could help them out a little."

The idea, in essence, is stunningly apposite. It strikes at the heart of the policy-making process that has so far failed not only to address the injustices and illegalities wrought upon the Koori population, but even, for the most part, to recognise them. It is only in the past few years, for instance, that works by historians such as Henry Reynolds, Robert

Chief Moses described the current constitutional clash between Quebec and the rest of Canada as "a bunch of thieves fighting over the proceeds of recent robbery".

Hughes and William Lines, which address the negative impacts of colonisation, have gained healthy circulation. It is self-evident that only by admitting and fully understanding its past can a nation move forward to an honest future.

In the United States, Canada, New Zealand, Australia and other countries, indigenous people are battling Englishdescended colonists over human rights and land rights. Other countries, such as India and Vanuatu, have already travelled the same bitter path and won constitutional independence. It is worth remembering that colonial regimes have rarely, if ever, withdrawn their authority without first facing concerted, sometimes violent, opposition from the indigenes combined often with the opprobrium of the international community.

That Anglo-Saxons have been one of the most successful, and ruthless, colonising powers in modern times should come as no surprise, except perhaps to those who read only English public school history texts. The Anglo-Saxons were created by the very act of dispossessing indigenous people. Starting with the Roman invasion of Britain in 55B.C., continuing with the Saxons in 367A.D. and then successive waves of other European peoples, such as the Danes and the Normans, the legitimacy claimed by what became the Anglo-Saxons is based entirely on the dispossession of the island's indigenes: the Celts.

There is a telling similarity between the still unresolved status of Britain's remaining Celts – 2000 years on – and that of Australian Kooris, polar Inuits, Maoris, Canadian and United States Indians. In all cases, history, as written by the colonisers, belittled and misrepresented indigenous culture and achievements. Acts of resistance, whether they be by Boeotia in 60A.D., or Koori fighters such as Pemulwuy, Yagan or Jandamarra in much more recent times, have similarly been either ignored or dismissed as unimportant.

Kooris, Maoris and North American Indians are frequently parodied as being drunk and stupid. The remaining Celts – the Scots, the Irish, Welsh and Cornish – are still tainted by

the same racist generalisations. Most importantly, it can be argued that the violence in Northern Ireland, the arson campaign of the Welsh Plaid Cymru in the 1970s and the continuing militancy of the nationalist 'Scotland Free By '93' campaign are all direct results of a state of affairs wherein Celts in some ways feel themselves to be oppressed and still view the Anglo-Saxons as the oppressors.

Seen from this perspective, the continuing reluctance of white Australia to reconcile itself with black, and the continuing disenfranchisement of Maoris and American Indians, is simultaneously less surprising yet more alarming. (It is possible, by the way, to take this line of argument too far. The otherwise admirable Sydney-based historian Patrick O'Farrell has stated that in the early period of colonisation the Irish settlers treated the Kooris "as human beings, as equals". This is unlikely. The Irish had themselves been brutalised both culturally and individually, and probably therefore saw the Kooris as an unwanted obstacle to their own freedom.)

Dr Eve Fesl, director of the Koori Research Centre at Victoria's Monash University, is well aware of white Australia's reluctance to face, and thus to risk repeating, its own past. It is not a situation that fills her with hope. "I think internationally there is cause for optimism, but nationally I think perhaps it will take another 100 years just to move out of the status quo," she said. "We haven't documented history here. Koori people will have to do that. Anglo Australians must come to terms with themselves."

Dr Fesl drew a comparison between Australia and South Africa, noting that it was the intense international pressure brought to bear on the latter that sparked the current wave of reform. "That will be necessary for Australia. Australia is very sensitive to international opinion, but the international community must be more probing," she said. "If the inter-

We need a de Klerk in Australia – someone who has got the guts to make a promise and stand on it... Dr Eve Fesl national scene becomes more probing Australia will react. We need a de Klerk in Australia – someone who has got the guts to make a promise and stand on it – but we also need the international push."

It could, however, be argued that the changes in South Africa are com-

ing about, albeit slowly, precisely as a result of de Klerk's weaknesses rather than his strengths. Clearly, the combined pressures of international sanctions and rising internal discontent forced the South African government into a position where diluting the structures of apartheid was the only way to forestall economic and political ruin.

What we don't need, she said, was the often mooted treaty or compact of understanding. The idea is a device which generates talk, not action. "There is no point in a treaty or a compact. All that's happened is a lot of semantic debate about what it means," she said. "What we need is land rights and compensation. If we get that, why do we need a treaty?"

Treaties, of course, have been a frequently employed device to reach agreement between indigenes and colonisers. They have rarely, if ever, worked in favour of the indigenes. Historian William Lines notes that, in Australia, a treaty was suggested in 1834 by John Lewes Pedder, Chief Justice of Van Diemen's Land. It was to give the island's

It is also, of course, fundamental for non-Kooris, particularly the Anglo-Saxon component of the population, to fully understand the patterns of its history.

Koori population a portion of the territory in perpetuity. The idea was rejected by other authorities and the result was genocide.

Lines also notes that a year later John Batman negotiated private treaties with Koori clans in Victoria so that he could 'purchase' vast tracts of country. The treaties were declared invalid by Governor Bourke – who nevertheless allowed Batman and others to remain on the land.

In 1990, in a hearing in the Townsville Magistrate's Court, Magistrate Doug Evans, in line with arguments put by a federal solicitor, ruled that the human rights covenant inherent in the United Nations Universal Declaration of Human Rights was nothing more than a statement of intent. The case, which involved a suit brought against the Commonwealth by a Koori alleging that the Commonwealth had been negligent in its responibilties with regard to the UN treaty, effectively absolved the Commonwealth from all internationally ratified treaties covering the rights of indigenous people.

Chief Ted Moses is a leader of the Cree nation, which centres around the James Bay area in the Canadian province of Quebec. His people, like many other Indian nations in North America, were the subject of treaties offered by the English. Their situation, however, has recently, and ironically, been further complicated. On one level, the Cree are negotiating rights with the current, comparatively progressive, Canadian federal government. On another, however, they are caught in the secessionist moves of the French descendants who control Quebec.

Any gains brokered federally, therefore, will not be guaranteed should French autonomy in Canada increase. Speaking at the Australian Museum conference, Chief Moses described the post-settlement historical process to which the Cree were subjected.

"As an indigenous person from Canada, I share more than the ordinary indigenous experience of dispossession and exploitation," he said. "We share a particular and peculiarly British colonial history. A history where everything has been done in the most careful and legally correct way. A history where our interests have always been scrupulously

protected by a State that has the highest respect for civilisation, the protection of individual freedoms, order and good government, and all of the rest. And of course you know what happened. Somehow the indigenous peoples ended up without their land, without their self-respect, and finally without the means to subsist."

The first Canadian treaties were made between settlers and indigenes on a regional basis. Until recently, the Canadian government argued that they were not binding because they were made before the federation of the nation. Later treaties have been similarly disregarded: with the

government typically arguing that certain provisions, such as the supply of medical facilities or monetary compensation, were not enforceable, while others, such as the surrender of land, were. The government has also argued that the protective provisions of international law do not bear on treaties with indigenous peoples. In the mid-'70s, Chief Moses was the principal negotiator of a treaty between the Cree and Quebec, sparked by Quebec's plan to build a massive dam on Cree land without consultation. The project went ahead, but the treaty, guaranteeing certain rights to health, education and future environmental protection, was signed in 1975.

The Quebec administration is currently trying to build another large hydro-electric project on Cree land, a development

opposed by the Cree. In the federal courts, Quebec is arguing that the 1975 treaty, which is supposed to protect the indigenes from such imposed development, is invalid. "Quebec went to court and told the court that the treaty was only a contract," said Chief Moses. "The Canadian Constitution guarantees that land claims agreements and aborigi-

nal treaties are protected as constitutional law. Quebec told the judge that it was not bound by our treaty. The Government of Canada, the fiduciary for Canada's aboriginal peoples, told the court that it agreed with Quebec. The treaty was non-binding – both governments argued this."

That contest still continues. At the same time, the French settlers of Quebec are arguing that they have a right to secede from the rest of Canada and form a separate state.



They do not admit that the Cree, should they wish to, have a similar right. Admirably concise, Chief Moses described the current constitutional clash between Quebec and the rest of Canada as "a bunch of thieves fighting over

the proceeds of recent robbery".

In New Zealand, the principal and much disputed legal document signed by the colonists and the Maoris is the Treaty of Waitangi, drawn up in 1840. Despite many breaches in the past, the Maori people remain confident that the document may yet guarantee fundamental rights. Unlike similar documents proclaimed in the U.S. and Canada, the New Zealand government has never attempted to fully invalidate the Treaty. In a landmark move in 1975, it created the Waitangi Tribunal, a commission set up to monitor Maori rights as defined at Waitangi.

Buddy Mikaere, of Christchurch, is the current director of the Tribunal. At the Australian Museum conference, he said he was optimistic that the Treaty, along with other factors, would eventually provide security for the Maori people.

"There has to be a change because the thing about 1992 is that it doesn't only have a past, it has a future," he said. "It was said recently that by the time the Treaty's 200th birthday comes around, Maoris could be 40 per cent of the population. That means most Maoris will have *Pakeha* (white) relatives, and most *Pakeha* will belong to a Maori *whanau*. That has to make us a different kind of nation from the one we think we are, but what its shape will be, and whether it will be a nice place to live, is something we don't know.

"Despite its ambivalent history, I believe the Treaty of Waitangi, with its potential to influence the relationship between Maori and *Pakeha* in New Zealand will have a lot to do with determining whether or not our country will be a nice place to live (in)."

Dalee Sambo, Chief Ted Moses, Dr Eve Fesl and others might well

argue that Mr Mikaere's hopes walk on fragile ground, but the relatively large proportion of the total population comprised by Maoris may yet provide an economic and political leverage unavailable to many other indigenous nations.

There have, of course, been some spectacular successes in the fight for self-determination by indigenous people. India is perhaps the best known example. One of the most recent, however, is Vanuatu, which shed 75 years of joint

The relatively large proportion of the total population comprised by Maoris may yet provide an economic and political leverage unavailable to many other indigenous nations.



French and British administration in July, 1980.

On that day, the 160,000 indigenous Vanuatans automatically, and for the first time this century, became citizens and land owners in their own country. Ownership of land is fundamental to indigenous determination. In Vanuatu now it is also inalienable: foreigners can only lease land through arrangement with the traditional occupiers.

Vanuatans speak more than 300 languages. One of them, Bislama, has been declared the national language. In a canny post-colonial move, however, English and French, as well as Bislama, have been declared official languages – the languages of business and international negotiation – ensuring that independence did not lead to isolation.

A decade down the track, the Vanuatan nation has created itself with a minimum of post-colonial trauma. The achievement is all the more remarkable considering not just the cultural diversity that exists within the 80 islands under its jurisdiction, but the historical legacy of the disenfranchisement and slave trading that marked the colonial period.

This year non-Koori Australians have engaged themselves in the most widespread self-examination since Federation. The nation's relationship with Britain is now firmly on the agenda, and the move towards republicanism now probably unavoidable. From an indigenous perspective, however, debate on the merits of republicanism will be futile without first debating the ownership of the land with its traditional inhabitants.

Ms Nerida Blair, policy advisor on Aboriginal and Torres Strait Islander issues to the Human Rights and Equal Opportunities Commission, told $21 \, {}^{\bullet}C$ that such debate must start now. First, however, the terms of reference must be decided – not by the settlers, but by the Kooris.

"I don't think the problems have been defined yet. The parameters are non-Aboriginal, the frameworks defined by non-Aboriginal people," she said. "The education process whereby the current generation will have a better understanding is still framed by a non-Aboriginal process and reference methodology. Until Aborigines are defining those structures any progress will be pedestrian.

"If we are to advance anything it has to be on our own terms of reference. Republicanism is an ideal opportunity for us. If we're moving into discussion about republicanism, it is fundamental to first discuss the rights of the first nations of this country."

It is also, of course, fundamental for non-Kooris, particularly the Anglo-Saxon component of the population, to fully understand the patterns of its history. This is tricky, because it requires a drastic shift in perspective. The Anglo-Saxon people in colonised countries have to come to terms with the fact that do not possess a root with that homeland stretching over many millennia. In that realisation perhaps they can understand the culture of indigenous people and learn to share those lands. Andrew Masterson is a reporter with *The Age* and the *South China Morning Post*. His last story for *21* °C was 'Bureaucratic Ecosystems'

Resistance to change

It is not a coincidence that indigenous societies are in a state of deterioration. Unfortunately, the indigenous perspective of contact reads like a horror story for most, if not all, indigenous peoples. The intent to convert indigenous peoples and bring them under the so-called "sovereignty" of kings, queens and other foreign powers created widespread strife despite some of the early attempts to ensure "friendly treatment" of the Natives. The maltreatment, enslavement, resultant suicide, punishments for resistance, malnutrition due to destruction of natural environment or over-exploitation of natural resources, and introduction of disease for which indigenous peoples had no natural immunity have all taken there toll on the indigenous peoples of the North. One example of dramatic population decline occurred during the first two generations of Russian domination from 1762-1800 in the Aleutian chain area where there was a population decline of 80-90 per cent.

Along with population decline came the destruction of the traditional social order. There was a desire on the part of the European invaders to deal with only one "permanent authority". Hence the village leaders were no longer the best hunters, but an authority figure identified and defined by the outsiders. Change also took place in the economic order with the introduction of cash and the notion that things could be bought and sold. This added the stress of a new economic environment quite opposite from the traditional economic order of most indigenous communities. These were all alien concepts to the collective social organisation of the Native communities. The creation of new conditions and problems for social order, control and security put most indigenous communities out of balance. Since first contact these conditions have only been compounded by the political and legal forces of the Western world.

The legacy of outside control is what indigenous peoples today are fighting against. Since the time of the first contact there has always been strong resistance to change. Certainly some adaptation has taken place over the last 500 years. However, there remains a desire to identify oneself and community as indigenous. The desire persists to regain a strong sense of security in the face of rapid social change.

Dalee Sambo is executive director of the International Union for Circumpolar Health in Alaska.

THE MUSEUM of THE FUTURE

Top: Learning about viscosity at Questacon. Right: Telecom's public telephone booth of the future. Below: Scienceworks building converted from an 1890s sewage pumping station.

Gone are the crusty old museums with artefacts in glass cases and Latin descriptions. Interactivity is the byword for exhibitions of the future, where the latest media technology will entice the visitor into education through play, finds Chris Williams.

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"This is not a temple to worship the principles of physics but a forum to demonstrate why culture is the way it is," says Robin Hirst, the manager of Exhibitions and Programs for Australia's newest museum. Scienceworks in Melbourne's industrial suburb of Spotswood. Hirst is amongst the new generation creating the museum of the future, a museum where one walks past the ancient ribs of a giant sperm whale into an interactive world of video monitors and computerised multi-media booths. "We don't want to support stuffy textbook science but, instead, to involve people in understanding the world," Hirst says. That means experimentation and hands-on exhibits at an individual level as well as community involvement."

To understand the contribution that science and technology is making to human culture one needs to look back at its effects on history and forward to its social and environmental ramifications; a major com-

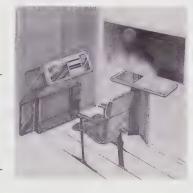
ponent of the Scienceworks site is a sewage pumping station built in the 1890s. The intact building of highly decorative Victorian architecture is being used to tell a story about public health and energy: typhoid was rife in Melbourne before effective sewerage was installed; the sewage pumping sta-

tion which represented state-of-the-art in sewerage disposal was driven by a boiler fired by coal; this state of technology reflects the massive use of fossil fuels this century; this in turn raises the question of the effect of burning fossil fuels on the environment and the social responsibility of seeking alternatives for future energy use.

Similarly, a CSIRO prototype of a hazardous waste converter, PlasCon, and an artificial heart used by the late Dr Chang will be on show. These demonstrate recent scientific developments with a view of the quality of life expected next century as a result of socially-responsible scientific endeavour.

Rather than compartmentalise knowledge, museums of the future are aiming to project to the public a renaissance, holistic view of science. This means ransacking the specialist knowledge of a range of sciences to encourage lay people to get involved and

see it as a part of their daily lives. Gone are the days of look but do not touch. A foyer exhibition in the new Telecom building in Melbourne presents an 'Office of the Future', activated by a smartcard



which lights up an office TV and video/ audio facilities, telephone and word processor. A fibre-optic display demonstrates how light passes along a fibre enlarged ten thousand times to more than two metres in size.

Scienceworks also brings as much imagination as possible into play to demonstrate new technologies. The materials section of the museum demonstrates new supermaterials in a social context. For example, an interactive display allowing visitors to pull extra-strong supermagnets apart is complemented by information about CSIRO's Division of Applied Physics using supermagnets to develop more efficient motors;

INTEGE.



Top: Merino Wool
Harvesting Pty Ltd's
automated wool
harvester in operation.
Right: Aboriginal
children experiment with
music at a travelling
Questacon show.

smash when hit by a sledgehammer are shown to have industrial and medical applications, such as tooling components and hip joints; lightweight, flexible polymers that visitors can handle are also shown as body replacement parts such as breast and testicle implants. In spite of the exhibition high jinks, museums will continue to take their role as educators very seriously. The Australian Museum in Sydney, for example, is a signatory to the International Council of Museums Code of **Professional Ethics** which emphasises non

ceramics that won't

profit-making service to society. The Museum's philosophy is to act as a catalyst in changing public attitudes and actions with an emphasis on research. High standards of scholarship within the scientific community by its researchers are crucial if the Australian Museum is to maintain credibility internationally and funding nationally.

Public entrance fees are generally opposed in principle by museum directors but the reality of the high costs of exhibitions means most institutions have succumbed and introduced fees this year. Exhibitions touring manager at the Australian Museum, Ross Clendinning, says the funding base, which is primarily a grant from the New South Wales Government, is constantly being eroded. "Philosophically, funding is a dark shadow that is overhanging the future of museums that can't be ignored," he says. "Programs that may be viable in Europe are often too expensive to mount in Australia which has to rely on a small population base."

But the trend, which has almost become a requirement, that museums move towards greater use of exhibition interactives points to greater collaboration between museums across state and even national borders to cover the costs involved.

Sydney's Powerhouse Museum, which broke new ground in Australia when it opened in 1988 with spectacular interactive exhibits, audio-visuals and working artefacts, these days looks towards collaboration and sponsorship from outside organisations to fund expensive exhibitions.

A new permanent exhibition titled Australian Innovations, due to open later in the year, will feature eight case studies of science and technology successes. They include an optical surface profiler for manufacturing, designed by CSIRO's Division of Applied Physics in conjunction with the Royal Australian Mint, and a robotic wool harvester, described as "one of the most sophisticated robots ever built by a combination of money, people and determination".

As a back-up to the exhibition, and the start of a major science information resource, the Powerhouse is developing a computer database which will describe hundreds of examples of Australian innovation in research, production and marketing. Visitors will be able to simply call up the information at a special computer station.

Senior curator of engineering and design at the Powerhouse, Rob Renew, has shown the foresight to develop a computer system along the lines of the Musée d'Orsay in Paris which has large-screen high-resolution images of artworks available for students. "Computer simulation or videoclips and audio animations with choice of access built into the software will all be feasible within five years," according to Renew.

"In exhibitions of the future there'll be greater use of story, with science and technology placed in a social and political

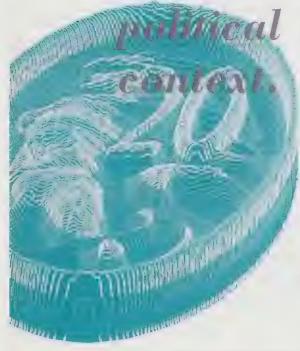


context. There'll be greater awareness of the role of museums as informal learning environments aimed at complementing formal education, and industry bodies as well as individual companies will recognise the benefits of sponsorship."

To protect the integrity of museums from sponsorship pressure, Renew sees greater flexibility through complementary sponsorship by many companies. The bigger the

Gone are
the days
of look
but don't
touch.

Science and technology placed in a social and



Above: Australian 20 cent coin imaged by CSIRO's Optical surface Profiler at Powerhouse. Below/top: Australian Museum model of extinct horned turtle. Below/bottom: 3D noughts and crosses game for visitors to the Powerhouse.

sponsors the more national the outlook, which also augurs well for collaboration between museums, especially for the lower-budget, late start-up science museums in Perth, Brisbane and Adelaide.

Questacon, the National Science and Technology Centre in Canberra, places a high priority on travelling shows that can be easily maintained while on tour. For example, a portable exhibit design using box lids as table-tops has been used in the Shell Questacon Science Circus which tours country towns in all states of Australia. An OTC 'Double 0 Double1' exhibition on communication, currently at the Powerhouse, will tour other states later in the year. Among new exhibits being designed for an Environment Exhibition to be launched late this year are 'Informative Garbage', 'Sustainable Fishing and Harvesting', and a 'Home Energy Jigsaw'.

Just as major art galleries organise travelling exhibitions to defray costs and maximise audiences, science and technology museums expect to be able to draw on the resources of a national and international museum network in the future – much of it by larger-than-life, full colour, interactive computer screen.

Science exhibitors such as the Singapore Science Centre have significant resources and opportunities for collaboration as showplaces for pop science. Showing multinational initiative, the Singapore Centre has gained support from the Canadian High Commission to exhibit, among other displays, a pedal-yourself, electricity-generated video camera and music machine as well

as an exhibit called 'Living in Water' which demonstrates the compatibility of plant and animal life for future underwater living. Mice have been placed in a submerged cage covered in a membrane which allows carbon dioxide and oxygen to pass through it. Under the influence of light, water-plants growing in the exhibit give off oxygen which the mice breathe while the carbon dioxide exhaled by the mice passes out through the membrane for the plants to use.

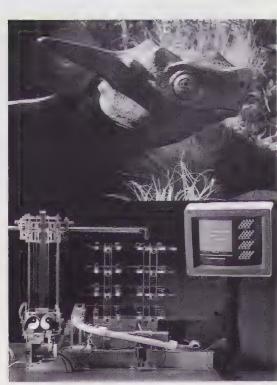
Similarly, Japan's National Science Museum in Tokyo places a high priority on showcase science. In a city where



View of the suspended aircraft in the revamped boiler house of the Powerhouse Museum.

space is at a premium, the Museum ranges over five interconnected buildings. Visitors can explore science systematically by category: Natural History (animal and geological specimens and displays showing the development of the Japanese people), Science and Technology (examples of traditional Japanese science alongside modern science and technology), Discovery and Air and Space (including large-scale exhibits of aeroplanes and rockets). The Museum's showpiece is an hour-long Science Theatre or moving diorama of dinosaurs, mammals, birds, insects and other animals and their habitats. One display allows visitors to operate life-size skeletons of cheetahs, bears and horses to compare their motion. Another exhibit opens up the world of dinosaurs and plesiosaurs, using a fossil display to explain the connection between ancient marine animals and fossils found in mountain ranges. The Science Theatre, described as a "complete innovation" is aimed at motivating young Japanese to study science.

Given that major national exhibitors all around the world will increasingly look towards expanding their audiences beyond national boundaries, Australian science centres are in a fine position to reap the benefits. Their increasing access to advanced communications technology such as fibre-optics and user-friendly software means the world's best in science exhibitry may soon be not only at our fingertips, but also satisfying other senses: aural, visual, oral and olfactory.



ravels in Hypermed

The social.

economic

media will

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consequences

of interactive

Museums face a re-definition of the word exhibition... television offers a public showcase writ large.

Researcher-in-residence with the Australian Museum, Chris Nash believes there are many parallels between the development of new interactive media and the history of radio and television that suggest "the social, political and economic consequences of interactive media will be huge". Although current projections about future developments are inadequate, "it would be foolish to turn away from the new media," he says.

Interactive media, or "hypermedia", are a combination of video and computers used to expand the storage capacity of pre-programmed data and the range of user-choice in accessing data. "They are not a substitute for human interaction in education, but an extension of the operational environment," Nash says.

Two developments which offer

be huge. museums great potential in public education are narrow-casting (signal to a limited number of subscribers such as for PAY-TV) and multiplexing (backwards and forwards transmission to and from multiple individual points such as videoconferencing and e-mail).

Nash sees these new technologies competing with broadcasting as the most common forms of audio-visual communication. Multiplexing especially holds enormous promise for museums in extending and intensifying their reach to untapped audiences.

"People will use multiplexed audio-visual media for their day-to-day activities at work and in the home. It will be an environment of information overload, in which the skilful design of information packages will be extremely important for their effectiveness and ease of use."

Nash believes it is too early to spend large amounts of money on interactive technology, but museums must meet current visitor and researcher demand for interactive technology as well as prepare for its future revolutionary uses "without wasting vast amounts of money charging up blind alleys".

As a first step, work has begun on a Rock Art interactive which might link into a collaborative project on cultural diversi-



ty being developed by a Museum Education Consortium made up of seven museums in the United States.

Nash also sees potential on PAY-TV for documentary co-production by museums, as all significant licence bidders have included a high-quality documentary channel in their proposals to the Federal Government.

Superbud

The Australian Museum will include stunning interactives in a Robotic Insects exhibition due to open in September. Titled 'Gargantuans from the Garden', the exhibition will feature allcolour animatronic drama. Visitors will move through a giant garden set, sharing space with a preying-mantis four and a half metres in size and a scorpion nearly three metres in length. Other features to authenticate the experience will be audio tapes of cicadas and bees, a sound and light show of a housefly, videos of locust plagues and insect camouflage, and a dung beetle rolling a ball of dung. To emphasise the diversity of insect life, more than a thousand photographs of insects will be on display and CSIRO's Division of Entomology will loan to the exhibition part of the Bornemizza beetle collection from the Australian National Insect Collection.

Right: Phalacrognathus muelleri from the CSIRO's Bornemizza beetle collection.



Met any exciting scientists lately? Robyn Williams has and he asks why the thrills'n' spills of life in the lab aren't better known to the rest of us?

RY AN EXPERIMENT. Take out whatever
Australian bank notes you are carrying
and look at the people whose portraits are
shown. Nearly half of those pictured happen

to be scientists. They are of international standing and, hardly known to the Australian public. How many can you name or write two lines about?

Very few scientists are, in fact, household names and it's interesting to contemplate why this should be so. Their working lives appear to be rather unspectacular: decades of fiddling with apparatus in some nondescript building and then perhaps a leap of brief fame as a few peculiar marks on a graph or print out is pronounced to be significant. Dozens of conferences follow at which the discovery is recycled.

Such is the image. It is, of course, quite
unfair. But so is the stuff of legend that real scientific
heroes represent. Einstein, the quintessential legendary
scientist, had his theory of relativity confirmed by something of an experimental fluke in 1917 (the bending of
light perceived during an expedition to view an eclipse
was recorded in a somewhat questionable manner) and
really did not influence the public scientific awareness
until the mid 1950s. Einstein's fame was, at first, as much
to do with politics and spiritual need as it was with his
physics.

Other heroes attained celebrity sometimes for ignoble reasons. Sir Alexander Fleming was a self-publicist; Thomas Edison was a relentless exploiter of ideas, both his own and other people's; Robert Oppenheimer was as devious as a hungry cat; and as for old Sigmund Freud... but perhaps he was not a scientist at all. (In case you're still puzzling: Fleming was the penicillin man, Edison the inventor, and Oppenheimer led the Manhattan Project.)

But why shouldn't scientific heroes be as vain, frail or even blemished as everyone else? This is really the point. Science may require high-powered cogitation and even some strange looking apparatus, but surely it is as human an occupation as any other? Thinking otherwise may be the reason so few of our accomplished scientists are known and perhaps also why there seems to be a major crisis in science in countries such as Australia, Great Britain, the USA and Canada. Young people are not being recruited to R & D in sufficient numbers, funds are short, and morale among the boffins is low in these countries.

And yet actual achievement and even

public regard of science have, in some instances, never been higher. Consider the extraordinary phenomenon of Stephen Hawking. His book *A Brief History of Time* has been in *The Sunday Times* top ten for *three years*! And this, a physics book! What's more, now it's a Spielberg sponsored movie! Consider the popularity of science programs around the world, both on radio and TV, and the fact that newspaper readers invariably put medicine and science at the top of their preferred subject lists in surveys. Yet hardly anywhere is the actual working life or history of a scientist displayed. Try to think of a single boffin in a TV series or movie: they are either walk-ons,

barmy or non-existent. There is, of course, Dr Who and Indiana Jones, but even I would resist suggesting their pursuits are typical of life at the lab.

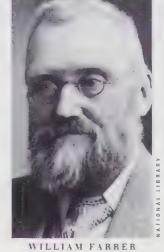
So what is it like? Firstly, it is one of the most exhilarating intellectual adventures possible. And I don't mean only for professionals: a four year old is fascinated by questions like "how does the moon stay in the sky?", "why are dogs' noses wet?", "why are there girls?". If only children received useful answers from the bewildered grown ups.

dren received useful answers from the bewildered grown ups.

Secondly, scientific work takes you everywhere on earth, if that's what you fancy – deep ocean trenches, coral reefs, remote deserts, distant caves, endangered

Thirdly, of those scientific heroes who have flourished in Australia, let's go back to those beak notes. Sir Joseph

forests, among the starving, up mountains, to the moon.





Banks, who has given his name to several Australian entities (Banksia the plant, Bankstown the suburb), was the botanist on Captain Cook's voyage of discovery to the South Pacific. He made his reputation with his Australian specimens and returned to London to become one of the longest serving

presidents of the Royal Society ever. He is on the \$5 note. 87 5-2 1, 6 7-2

Laurence Hargrave graces the \$20 note, he who pioneered flight with his exquisite models of kites and possible planes. His experiments at Stanwell Park, south of Sydney, included flying "16 feet above the ground" attached to one of his kites – this was in the 1890s. That he was beaten into the air by the Wright brothers (1903) may have been due to the minimal technical and moral support Hargrave recieved in the colony

On the \$50 note smiles (a trifle embarrassed – he eschewed the limelight) one of the giants of 20th century medicine: Howard Florey, who turned penicillin into a usable drug 50 years ago. His was a formidable intellect. Though based in Oxford, he maintained strong links with his native Australia and was, indeed, one of the forces behind the establishment of the Australian National University.

Also on the \$50 note is Ian Clunies Ross, veterinarian and parasitologist, who made his most famous contribution as chairman of CSIRO, Australia's state-run research organisation. Clunies Ross showed how closely science and society's interests are linked and focused our R & D in a way that has held for the latter part of this century.

Glowering from the \$100 note in his balaclava you can see a man who really gives the lie to any notion that the scientist's lot is humdrum. Sir Douglas Mawson, the great geologist, explored Antarctica with a courage and resilience that are the stuff of legend. He endured physical challenges which would have crushed a person of less fortitude and still managed to make profoundly important contributions to the earth science of the south.

On the other side of the same note you will find the great comet hunter John Tebbutt who pioneered astronomy in 19th century NSW and published 300 papers on everything from eclipses and the position of planets to meteorology.

And let us not forget William Farrer, even though our \$2 note is no more. He who anticipated Gregor Mendel's ideas on the inheritance of genetic characters managed to breed strains of wheat best suited to Australian conditions and, according to historian Ann Moyal, was fundamental to the establishment of an industrial base in this country.

So much for the scientists on our money. They outnumber other professionals many times over. And now Britain has even removed Shakespeare from the 20 pound note, to be replaced by Michael Faraday, the genius who exposed the mysteries of electricity!

But away from bank notes our scientists are given scant recognition. How many are aware that television was actually invented by Henry Sutton in Ballarat in 1885, three years before Logie Baird was even born? Like Hargrave, Sutton was a victim of the "tyranny of distance" and his patent was ignored until Baird himself

made use of it just before World War Two.

Then there are our Nobel laureates (apart from Lord Florey). How many can name Sir Macfarlane Burnet who revealed the secrets of immunity, or Sir John Eccles, the neurologist, or Sir John Cornforth, the chemist who achieved the highest levels of scientific accomplishment despite being deaf throughout his long academic career?

I also insist on claiming Sir Laurence
Bragg as a native born Australian. He still
remains the youngest in history (25!) to be
awarded a Nobel Prize and this for work he did at 22.
Bragg, like Florey, was born in Adelaide, and managed to
elucidate how X-rays pass through matter. He actually
put right his father's erroneous ideas and enabled both to
share the Nobel – a rare example of keeping the prize in
the family.

Bragg's work established a whole new field of science, no less, that of molecular biology, making possible the later discoveries of Perutz, Watson and Crick, Kendrew, Dorothy Hodgkin, Klug and countless others. It

These are people who have helped change the whole world beyond recognition. Why are they not our heroes?

was what made genetic engineering possible: Laurence Bragg showed how to picture the very shape and structure of molecules and thus how they work.

Are these names familiar? I'd be surprised. Yet these are people who have helped change the whole world beyond recognition. Why are they not our heroes? Even though their theories may be a trifle difficult to manage in one sitting, the results of what they have done are everywhere. Could it be a matter of fashion? I believe so. After all, I've not mentioned a single woman scientist so far and there is no doubt at all that several women did heroic scientific work in Australian history and many more are flourishing today.

Think of any names? But that's another story.



las Clesies noss

HOWARD FLOREY



LAURENCE HARGRAVE

Our currency may favour one gender, but science does not. Robyn Williams surveys the role of women in the history of science in Australia.

T'S DIFFICULT ENOUGH for most people to think of even a handful of international names of women in science, let alone Australian names. There's Marie Curie, of course, born in Poland, worked in France, winner of two Nobel Prizes in physics and chemistry. There's Barbara McClintock from the US, who won the Nobel in 1983 for her work on 'jumping genes'. Then

there's the formidably brilliant Oxonian Dorothy Crowfoot Hodgkin OM, worthy of three Nobel Prizes, recipient of one, for revealing the structures of biochemical molecules such as vitamin B12.

Who else is there? Those, perhaps, who have added a touch of adventure to their scientific enterprise, such as Dr Sally Ride, the American physicist who was also the first Western woman in space, or the two renowned ape watchers Dr. Dianne Fossey and Dr Jane Goodall.

But what about Australia? Well, the first Australian women to make

significant contributions to science were Aboriginal. They experimented with native plants to find medicines and balms that were later to receive confirmation in European science. For example, they used yams commonly available in Queensland that acted as a kind of contraceptive. (These were eaten.) The chemical ingredients of the contraceptive pill are actually obtained from Mexican yams.

But Aboriginal women also carried out the most fundamental of scientific tasks: they recorded what they saw, usually in the form of elaborate paintings. Some extraordinary beasts, such as the pig-nosed turtle of northern Queensland, have actually been discovered because a cave painting suggested they were nearby. Right now the chase is on for a giant echidna whose image has been found in Arnhem Land.

And it was this tradition that Australia's first female scientists from Europe continued, Elizabeth Gould came here with her famous husband John in 1838. She studied the startling abundance of birds and mammals, producing about 600 drawings and paintings. After the bizarre representations made by the early European explorers that showed kangaroos looking like greyhounds or rats, hers were among the very first pictures to be of use to zoologists in London.

Historian Ann Moyal writes: "Elizabeth Gould was the first professional, qualified woman natural history artist

to draw in the colonies, and after her death in 1841, within a year of her return to England, her fresh sketches passed to other artists whom John Gould engaged to bring out his brilliant publications on Australian birds and mammals." Of course, she is in one way made immortal: the Gouldian Finch is named after her.

Before Elizabeth Gould there was Georgiana Molloy, who arrived in Western Australia in 1830. She was dubbed the 'Madonna of the bush' (implying her likeness to the one from Nazareth rather than the pop star from Detroit!). Georgiana knew little botany, but, Ann Moyal records, was anxious "not to be without flowers".

So, like Gould, she set out to study, sort and collect the native species. She worked around the Augusta and Vasse Rivers in south-west Western Australia, sending

> specimens of dried plants and seeds to London. Her talent and resourcefulness, for one so young and with such little formal training in botany, were remarkable. Sadly like Elizabeth Gould, Georgiana died young, in childbirth, in 1843. Her specimens remain at Kew.

Louisa Atkinson was actually born in Australia, in Berrima, NSW. She explored the interior, sketching plants and recording items of geological interest as she went, especially along the Gosse River, the route of Allan Cunningham's investigations. She was described as "one of



ELIZABETH GOULD

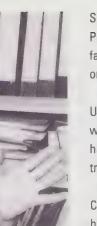
the most interesting of Australia's daughters" by another botanist, William Woolls, but, again, died during childbirth in 1872. So often female intellectual endeavour was cut short in this way during the first century of European

Another botanist, Amalie Dietrich, came to Australia from Saxony in 1863, already with substantial experience as a collector. In Queensland, starting in Moreton Bay, she "virtually alone, amassed one of the most outstanding collections made by a single person". She was the first professional woman naturalist in

Australia. "Within eight months," writes Ann Moyal, "she had explored from Brisbane to Gladstone and Rockhampton and dispatched 12 cases of botanical and zoological specimens to Hamburg".

Dietrich wrote this to her daughter: "You can have no idea how things flourish here, and

what a scramble there is for space. Ferns, amongst which I disappear entirely, grow under the giant trees, and I am often frightened when I have to force my way through the luxurious creepers, ferns and branches. Large orchids hang from trees by almost invisible



threads; they are so wonderfully formed, have such a beautiful colour, and look at me so mysteriously, that I pick them with a certain awe." Dietrich went on to enjoy recognition and fame for her work, an honour received by few other women in 19th century Australia.

Ann Moyal records many women in the colonies who contributed much. Most were biologists, such as Louisa Anne Meredith, Caroline Atkinson, Mary Morton Allport and Marian Ellis Rowan. Their contributions were invaluable but their names are little known today outside specialist circles. The scientific societies of the time were typically exclusive to men and those few women who were allowed entry (temporarily) probably felt uncomfortable. Even now the tradition continues. Out of about 259 fellows of the Australian Academy of Science listed for 1990, only five are women!

One of them is Dr Dorothy Hill, a fellow for 35 years. She was president of the academy in 1970. Her work on the geology of coral reefs is known internationally, but I suspect there are few households in Australia that would recognise her name.

Interestingly enough, one of the very first big scientific expeditions to explore the Great Barrier Reef, in the mid 1920s, was numerically dominated by women.

Throughout the 20th Century many Australian women have influenced the nation's history with their research.

To mention but two: Dame Jean MacNamara, a physician whose main interest was poliomyelitis, advocated the use of myxomatosis to control rabbit numbers long before it was, for better or for worse, taken up; and Dr Helen Newton Turner, a legend in her field of animal genetics, was one of the driving forces behind our improvement of sheep breeds.

As for 1992 – well, there are few one would be so bold as to call scientific 'heroines', although their achievements are certainly worthy of the accolade. It's just that Australia, like America, Britain and Canada, is going through a slump in the public acknowledgement of academic accomplishment. If we are to make the most of half of the brains in the population, then the budding female scientists in our secondary schools need some examples to look up to. Let's list a few.

Professor Adrienne Clarke is one. As director of the CSIRO, she is the most influential woman in Australian science today. She is a botanist of the modern kind, using genetic manipulation to invent new plants. She is in the

Science Council, which gives advice to government. But Professor Clarke has other, more flamboyant claims to fame. She was the one who advised Dame Edna Everage on the sex life of gladioli!

Dr Kerin O'Dea is professor of nutrition at Deakin University in Geelong, Victoria. Her studies and work with Aborigines in the outback of Western Australia have helped revolutionise concepts of diabetes and its treatment.

Also in Western Australia, at the University of WA, is Cheryl Praeger, a mathematician of the first rank, who has translated her skills to the maths of everyday life. When not doing research or giving talks to girls, she advises the Prime Minister on science policy.

Dr Nancy Millis, at the University of Melbourne, studies microbes. She began her career working on the microbiology of booze, specifically of cider. Now she heads a committee of national importance that examines the use of genetically engineered organisms released into the environment or otherwise causing possible concern.

Dr Priscilla Kincaid-Smith, also from Melbourne, is a world renowned expert on the kidney. Her main preoccupations are the effect of pain killers on kidney function and the availability of donor kidneys to patients on dialysis who might die without one.

The recently appointed deputy executive director and general manager, scientific, of the Australian Nuclear Science and Technology Organisation (ANSTO) is Dr Helen Garnett. Dr Garnett has been professor and head of the Department of Biology at the University of Wollongong since 1987. Dr Garnett has been concerned with international and national collaborative research,

including the development of anti-body and DNA probes for detecting pathogens in the environment.

The director of Australia's Commission for the Future is a woman. Susan Oliver graduated from the University of Melbourne as its first ever female bachelor of building science.

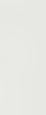
A recent arrival from northern England is the redoubtable Ann Henderson Sellers. She started in maths and physics as a girl, developed a love for astronomy, then studied weather. She is now an international authority on climate change, especially relating to our region. Professor Henderson Sellers is at Macquarie University and on the Australian Science Council, advising on national policy.

Dr Fiona Stanley works in medical research in Perth. She's trying to discover what puts new born babies at risk, everything from chemicals to poor nutrition of mothers. Her approach combines scientific excellence with a realistic understanding of social problems, the kind of breadth the field demands.

There are many more names and they are gradually becoming well known. So they should. Australia's future depends on its brains, of which half belong to the female population. We cannot afford to do without them.



Prof. CHERYL PRAEGER



[Continued from page 49] had somehow felt unique, strange and incomprehensible and then I was just like an animal.

Is that the same sort of situation as we discussed before with Terry Thomas, the comedian who had Parkinson's disease?. He couldn't walk through the door because he was kind of frozen, but he could dance through the door if he were singing. Yes, I think this is very similar. People with Parkinson's often sometimes can't talk too well but they can sing and of course people who stutter terribly and have lost their melody of speech can also sing or recite very well. I think in Parkinson's it's as if the timing parts of the brain, the organ of succession has been damaged. I think music can form an artificial organ.

It just shows you how much you are subject to the chemicals of your body. Going back to what we were saying before about the consistency of person. One reads a great deal about folk who perhaps have a severe accident – a bump on the head – and their personality changes dramatically or something else happens, maybe secretions change. In other words do you become truly a different person?

I don't think something which is completely alien can be introduced, but something which is perhaps an aspect of you can become exaggerated. One saw this sometimes with the sleeping sickness, the *encephalitis lethargica*. When it occurred in adolescence it was as if there had developed an accessory personality. One sees this very much with Turet's syndrome where there may be a 'Mister T', another part of oneself, with impulses and lusts and hungers somewhat different from your own. If this other part develops too early or is too strong or your own personality is insufficiently

If a part of the body ceases to be active and ceases to be sensible, then it drops out of the mind.

developed, then I think it can overwhelm you. These are almost like Jekyll and Hyde situations although I wouldn't want to put any moral emphasis on this.

But this is the point. The moral question is what's intrinsic to everything you write it seems to me and that's why we enjoy it so much. You're not writing about freaks, you're writing about every person, and what you're showing is how we are subject to everything from the anatomy that we inherit to chemicals that affect it. But where is the moral control possible when we are being buffeted about by all these biological circumstances?

Freud remarked of some colleague of his who had committed a grave moral sin, that a gentleman wouldn't have an unconscious like that.

Freud would.

Recently I wrote a piece about a young man with severe

frontal lobe damage. This young man still preserves some of the proprieties and the delicacies even though he has no frontal lobes. I contrast him with another patient who had become a rather frightening, callous, aggressive, talking machine. But this man previously had the personality of a New York cabbie. Whether his frontal lobe damage just exaggerated that I don't know, but I do think that the moral centre can be rocked by things like frontal lobe damage. I've always been hesitant to write about this because I think maybe I want to think that the self is somehow impregnable, there's some citadel which is immune to organic assault.

Yes, and in your writings you ask us to look more carefully at the people who in some ways are trapped inside their bodies without being able to give the normal human signals, make us recognise that there is a person still in there even though it may not be obvious.

Yes, I think so. With the two people with frontal lobe damage you can in fact still address the moral centre and the former self. It's not gone – it's still there somehow amid all the devastation. I think that the self usually is, or perhaps always is.

What do you think about the potential in your field? I ask you because I think many neurologists or scientists have said that the brain is the most extraordinary and mysterious couple of kilos of matter in the universe. It is still only a tenth understood if you're lucky. Yet now we have techniques ranging from the drugs we can use, to the laser beams with which we can penetrate the brain, through to the transplantation techniques of taking foetal brain tissue and putting that into brains infected by Parkinsonism and sort of rewire them in a way. What do you think the potential is for making bad

brains or sick personalities fixed?

Well, I think you've really asked me two questions there. One is about our understanding, the other is about some of the practical procedures. If I can address the first for a moment, I think it may not be a question that we understand – that 90 per cent is still mysterious and that we only understand 10 per cent. We may in fact profoundly misunderstand and one may need completely different forms of under-

standing and forms of approaches, especially when one is dealing with forms of consciousness. But we can come back to this later. Certainly, 5 or 10 years ago healing and growth and regeneration in the nervous system were regarded as impossible. There was the notion that any damage was permanent. And now one certainly has very nice demonstrations in animal models of regeneration at every level from the peripheral nerve up to the brain. I think with things like Parkinson's disease and other of the so-called degenerative diseases one may not only be able to halt them but one may also be able to encourage regrowth of damaged but still alive neurones and indeed have transplants which not only act as chemical pumps but become organised as proper neural circuitry. This is incredible and had one spoken of this five years ago it would have sounded like science fiction. Parkinson's is still not a good thing to acquire, but there is very much more hope for someone than in the *Awakenings* days when there was only chemical replacement. I think one is also seeing some wonderful interweaving of computers with the nervous system at every level from virtual reality and the games of mathematicians to putting computer pulses in the spinal cords of paraplegics and getting them to walk. So I think all this is tremendously exciting. I think the ultimate questions like consciousness and individuality are different. There I think we may need models which have no physical analogy whatever and which are not like telephone networks, not like computers, and I think a completely different sort of thinking may be needed. This for

Are you impressed by the people writing about this like Capra in The Tower Physics, like Roger Penrose in The Emperor's New Mind? They are taking perhaps a more critical view of the computer models. Do you think the general writing on consciousness is coming to grips with the subject properly?

me is some of the most exciting stuff going on.

Some of it. I would certainly agree with Penrose that all sorts of thinking is not in the least algorithmic or computational but something else. On the other hand I think he also jumps from quantum physics to a sort of Platonic mysticism in a way which I don't go along with.

Back to the soul you mean?

Right. Now everything must be lodged in the actual nervous system and the way it develops and the way it can function. What to me is much more exciting has been the ongoing work of Gerard Edelman who was really the man who cracked the problem of self or soul, if you want, in the immune system and how the immune system could recognise 'self' as opposed to 'non-self'. In the last 15 years or so Edelman has been looking at the nervous system. He has this intriguing theory which he calls Neural Darwinism. How under the pressure of experience, the neuronal groups will talk with each other, and will gradually shape themselves to experience. I think this is something which is very different from the computational model coming out say in Edelman's work.

It's an interactive, organic model isn't it?

Yes. And again Edelman himself is making some strange sort of creatures which are not at all like robots – they're not like the robots which Ross Ashby and Greywater and others made. These creatures have names like Darwin 1, Darwin 2 and there's now a Darwin 4. These creatures have sense organs and they can move without being programmed or instructed about their environment. They can create a world picture of their simple environment. Darwin 4 is very, very slow in movement – one really needs to have a time-lapse film to see it there, but I think it's very uncanny to watch it because it's like seeing a very simple creature which makes, creates perceptual categorisations and judgements and explores the world and it's not at all like a robot.

I think this sort of thinking from Edelman in particular makes one begin to think that consciousness is becoming a

problem we can perhaps grapple with.

Yes, but the more you know biologically and intellectually about the nature of the mind, are you more impressed by its subtlety and interest or are you sometimes thinking 'We're reducing it to a question of matter and circuits and therefore it's getting diminished'?

Or a matter of quantum theory. No, I don't think I have the feeling with, say, Edelman's theory, that it's at all reductive. I think it does reduce the mind to circuits. It shows how a

I think that self-hood depends on the unique neural circuitry and the way in which it has been moulded by experience.

mind or an organism can open itself to the world and incorporate a world in itself and become a world. Though I have heard Edelman and others refer to this as the new wave of Exuberant Materialism. And one does wonder whether things will get reduced in it. An interesting philosophical prototype I think is Spinoza who objects violently to the Cartesian Dualism in the separation of body and soul and said, if only we knew enough about the organism we would have no need to posit any immaterial element outside it. It's interesting, I was recently talking to my students about consciousness and about a third of them said they never used the word and it seemed vague and waffly and not something a neurologist could give sense to. About a third of them said the mystery of consciousness was ineffable and could not be approached by any empirical means. And about a third of them said they thought it was an empirical problem which would be licked or largely resolved in 20 years. I think my own orientation is moving to that last one.

Licked in 20 years?

Well at least I think we may understand it much better in 20 years. I don't think anything is ever licked and I don't think science is finite. In physics, at the end of the last century, people felt the essential problems had been worked out and all you needed to do was add a couple of more decimal points. Then of course radioactivity and relativity came up and the whole world picture changed completely. Now, I think the whole world picture has to change to understand consciousness and thinking. But I think it's beginning to change now. This may almost have something to do with Gödel's theorem that one can never fully understand oneself.

It's never the end of history.

I hope not. I think not.

Robyn Williams is the Chairman of the Australian Commission for the Future and executiive producer of the ABC Radio's Science Show. His last story for 21°C was on Adrienne Clarke.

[Continued from page 53] space and time, and then getting folded back into the world, into the explicate order. So he's got a model of how the connection might work. Some people like the idea of extra dimensions. Others think of a kind of morphic ether. All these are different models. No doubt many more can be suggested. But as far as this theory is concerned, it doesn't matter which model you have of the process. The key thing is the investigation of the idea that this process does happen.

If I can just continue on this vein of testing the idea of formative causation: since the publication of A New Science of Life there have been international contests to find the best test of the theory.

Could you select one or two experiments which you feel have best supported your ideas?

Yes. The first contest was in the *New Scientist* magazine in Britain for ideas for testing it. Some of them were then taken up by people who then went in to the next contest that closed in 1986, sponsored by a group in New York. That led to three very good prize-winning experiments; all of which concerned human learning and all of which showed a morphic resonance effect. Those are described in my second book *The Presence of the Past*.

There's now been a third competition, for student projects. The short list of the six leading entries I saw just before I came to Australia. Five of them are again to do with human

psychology. All five showed dramatic morphic resonance) effects, amazingly significant results.

It's not the best experiment actually, but it's the easiest of explain. This was done at Nottingham University, and the girl who did it there worked on the principle that if morphic resonance is happening, if there is this kind of collective memory, then it should be easier to solve today's *Evening Standard* crossword puzzle tomorrow than it would have been yesterday (laughs), because so many people have done it today.

So she actually persuaded the *London Evening Standard* to supply their crossword puzzles in advance, and did the tests in Nottingham where it's not on sale (it's just a London paper), tested one group of people/students the day before and another group the day after. They were given both the test crossword and also a control crossword that had been published a few months earlier. You wouldn't expect the control one to change, and in fact what happened was that the performance on the control crossword was more or less constant. There was no significant alteration before and after. But people got significantly better at the test crossword, there was a 20 per cent improvement the day after it had been published compared to the day before. This result has a lot of implications. It means that if you want to do well on crosswords wait until the next day (laughs).

Of course, research on morphic resonance doesn't attract vast funding from official funding agencies. In fact it attracts none at all (laughs). So, these experiments fortunately can be done simply and cheaply. There is now some funding for morphic resonance research owing to the generosity of Lawrence Rockefeller, the American magnate.

How has the scientific community in general reacted to your books and your theory?

Some members have been remarkably open and discussed it quite fairly. For example, *New Scien-tist* magazine ran this contest for ideas for testing it, and they've done quite a number of

articles and had a lot of correspondence. Other journals, such as *Nature* magazine, have taken the opposite view. The first book, *A New Science of Life* was denounced in an editorial headed 'A Book For Burning'. It was an extre-mely emotional attack, which was actually of great benefit to me; it caused the book to sell out within a few weeks (laughs). Since then they've maintained a fairly steadfast opposition.

My new book, *The Rebirth of Nature* is being reviewed for *Nature* by James Lovelock, the Gaia man. They could have sent the book to somebody entirely hostile. I don't know whether Lovelock will like it, but he's certainly an interesting and appropriate person to review it, and if I had to choose someone myself I

i and have chosen him. (Lovelock's review stated that 'science in not threatened by the imaginative ideas of the Sheldrakes of the world, but by those who would censor them'.)

The reactions vary enormously. A few people in science are kind of born-again Darwinians, who are extremely evangelical adherents of a materialistic and mechanistic world view and who are extremely intolerant of any other point of view. They are bigots, and they tend to oppose what I'm doing.

On the other hand, in almost every department I've talked in, there are people who are remarkably open-minded; holists, often secret holists or sympathisers. The atmosphere of many biology labs seems to be like Russia under Brezhnev, where there's still a kind of rigid orthodoxy, but increasing numbers of people don't really believe it, but it's not safe to say so.

There are a lot of people in the scientific world who are, as it were, in the closet, and I think that the atmosphere will begin to change – as it has in physics (which is a much more open and pluralistic science now) – in biology and medicine. There are already a lot of people who want a different kind of world view, beyond mechanistic reductionism, the idea that nature is inanimate and just machine-like.

In The Presence of the Past you talk about two different scientific approaches to understanding nature, which seem to have

co-existed throughout the history of science. One approach deals with eternal, unchangeable laws of nature, the other with the concept of laws which change and evolve over time. Could you expand on that?

The idea of eternal laws was built into science at a very early stage. It goes back to ancient Greece, where the Pythagoreans, the followers of Pythagoras, believed that the eternal basis of reality was mathematics. Plato thought that there was an unchanging realm of forms and ideas. These kinds of notions have played a large part in the development of science ever since the 16-17th centuries. Most physicists still take for granted

the idea of eternal laws which are governed by mathematics.

The evolutionary ideas started off really in the Jewish and Christian religions, the idea of history as a progress towards some culminating event, like the coming of the Messiah, or the coming of the Kingdom of Heaven. Then they got secularised to the idea of scientific and technological progress. Then they got generalised to the idea of human progress. Then in the 19th century, they promoted the idea of biological progress, so that the whole of life was seen to be developing. And since 1966, with the evolutionary cosmology, to the idea of cosmic evolution; everything in nature is evolving.

Now, if everything in nature is evolving, the idea of eternal laws has

really had the rug pulled from under it. Because people used to believe until '66 that there was an eternal universe, eternal tax's made sense. In an evolving universe, we can at least ask the question, "Why shouldn't the laws of nature evolve?". And real laws, human laws, do evolve. Actually I think that it's better to shift to a metaphor of habit, in an evolving organic, developing universe, the biological metaphor of habit I think makes much more sense than the legal metaphor of law which is really derived from human political systems.

On the subject of "habit", there's a quote in The Presence of the Past from the American philosopher C.S. Pearce, it says, "Matter is merely mind deadened by the development of habit, to the point where the breaking up of these habits is very difficult". Could you deal with that briefly and perhaps talk about other philosophers from the past who have had similar ideas to your own?

Yes, Pearce had this idea for the same reasons I do. When the evolutionary ideas became popular in biology in the 19th century, he was saying in the 1860s and '70s, "Well, if all life evolves, why shouldn't the whole cosmos evolve?". The physicists said, "Oh no, it doesn't evolve, because all matter and energy are constant and the laws of nature never change", and that kind of thing. But Pearce was very far-sighted. He was a hundred years ahead of his time really, and he saw that this evolutionary idea,

if applied to the cosmos would undermine the idea of eternal laws and lead to this idea of habit.

The principal model we have for habit comes from our own experience. We know that new ideas and new ways of doing things are at first conscious, in the conscious mental realm, and then through repetition they become increasingly unconscious and habitual. So habit itself arises through repetition, along with a kind of deadening or loss of consciousness, until we get unconscious habits.

A similar idea was put forward in the 1870s by Samuel Butler, the English author, who wrote two books related to this theme.

One of these books was *Unconscious Memory*, and the other was *Life and Habit*. In both he argued that the nature of life is essentially habitual. He even went on to suggest that atoms and even the so-called "non-living" things are also essentially habitual.

Nietzsche, the German philosopher, had similar ideas. So did William James, the American philosopher. So these ideas were actually quite widely discussed in the late 19th and early 20th century. But then there was a clamping down on this kind of speculation because in biology, the discovery of the chemical genes meant that biologists said, "Oh there's no such thing as this kind of mysterious memory. It's all just chemical. It's all just in the

genes." Ever since then, with the rise of genetics and molecular biology people have accepted that this must be correct, because it's been successful in a limited realm.

In the realm of physics and cosmology, the physicists clamped down and said the universe is far, far from evolving; it's running down towards a thermodynamic heat death, running out of steam; the cosmos is dissolving into chaos. Those views seemed to make those philosophers' speculations just irrelevant. When I came to think in this way, I didn't know that these lines of thought had been expressed before. These were very far-seeing philosophers. And it just shows how slowly, in a sense, science evolves. Ideas that were crystal clear to them, and which I think are crystal clear today, were just brushed aside for decades and decades because people were so mesmerised by the mechanistic philosophy in science.

When I've tried to explain your theory to friends, they usually react favourably, and seem to react to your ideas almost as if they were common sense. Have you also found this to be the case when explaining your ideas to people who aren't scientists?

Yes, I've found that most non-scientists find these ideas quite easy to assimilate and find that they do make sense. And not just people in the West. When I was developing some of these ideas in India, my Indian friends found them even easier to grasp,

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IENTISTS' RESPO

THE EDITOR

OF 'NATURE'

DESCRIBED 'A

NEW SCIENCE

OF LIFE' AS

THE BEST

CANDIDATE

FOR BURNING

THERE HAS

BEEN FOR

MANY YEARS.

The scientific community's response to Sheldrake's theory is fairly difficult to gauge. References to him and his work in scientific journals have been limited, perhaps giving credence to the Professor of Ethology at Cambridge, Patrick Bateson's assertion that the scientific establishment simply closed ranks on Sheldrake and dismissed him.

When he has not been ignored, however, Sheldrake's peers have expressed everything from outraged condemnation to the highest praise. For example, John Maddox, the editor of Nature, described Sheldrake's first book A New Science of Life as an "infuriating tract... the best candidate for burning there has been for many years". Professor Lewis Wolpert described Sheldrake's ideas as "just nonsense", while Australia's own Dr Mel Dickson recently stated on the ABC's Science Show that Sheldrake is "explaining one piece of ignorance with another piece of ignorance", although it must be said that Dr Dickson's reasoning was somewhat bewildering, to say the least.

Other scientists, however, including the wellknown physicists Paul Davies and John Gribbin, as well as biologists David Bellamy and James Lovelock, have been far more flattering. Bellamy even went so far as to say that The Rebirth of Nature would take pride of place on his bookshelf

next to Charles Darwin's On The Origin of Species and James Frazer's The Golden Bough!

Of all the scientific journals, New Scientist has undoubtedly been most supportive of Sheldrake, having published a number of sympathetic articles on formative causation over

> the years. The magazine also sponsored a competition in 1983 to test Sheldrake's theory.

> Yet the actual 'scientific' response, in the sense of government-sponsored research efforts to test Sheldrake's theory, has been virtually zero. What little testing has been done has generally been sponsored by Sheldrake's supporters, as "no self-respecting university would allow good research money to be spent on such hokum", as one scientist confided to me. This independent research has almost invariably supported formative causation.

> The most recent experiments, and perhaps the most rigorous so far, have been conducted by Sheldrake himself and the eminent biologist Professor Steven Rose of the Open University, England. The results are still to be published.

When Sheldrake was in Sydney late last year, he was claiming another victory, while Rose maintains that Sheldrake's interpretation of data was faulty. The controversy remains unresolved and will no doubt remain so for some time...

because in Indian philosophy there's a tradition of thinking in terms of causal influences through time; like the theory of karma. And so in India, people found them entirely natural. Even in the West many people find them quite natural.

The people who resist them most are indeed scientists, and among scientists, usually biologists, because they've been trained to think in terms of inheritance, in terms of chemical genes. Physicists, although they're deeply wedded to the idea of eternal laws, are also in general used to a plurality of views. I mean, physics is no longer a doctrinaire, monolithic orthodoxy. You can think what you like in physics as long as you've got as just a metaphysical view, but a testable scientific hypothesis. Ph.D. (laughs).

You said earlier that your Indian friends had no trouble under standing your theory. It does seem to bear similarities to some ideas in Eastern philosophies, like Buddhism. What do you see as some of the parallels?

In philosophies of Hinduism and Buddhism, based on the notion of karma, there's this theory of invisible connections through time, and that's very similar to what I'm saying. There are many theories of karma in Hinduism and Buddhism, and the ones find most interesting are the ones in Mahayana Buddhism. where they generalise the idea of karma to the whole of nature, and have the idea of a kind of cosmic memory.

The Theosophists took up that idea and developed their notion of the Akashic Record, which again is the idea of a kind of cosmic memory. And in general terms what I'm suggesting is similar; the difference is I'm trying to formulate it in scientific terms. These ideas came to me in the context of developmental biology and Western philosophy. I didn't in fact derive these ideas myself from Eastern philosophy, although I soon discovered that there were striking parallels.

In these Eastern philosophies, as far as I know, no-one's tried to do experiments to test the theory. I'm trying to make this not

Could you tell us about your new book?

The new book is called *The Rebirth of Nature*, this book goes rather further than A New Science of Life and The Presence of the Past - I'm looking at our whole attitude to and theory of nature. Not just in the realm of developmental biology or morphogenesis in science, but how our entire scientific theory has shaped our civilisation. How the ecological crisis is related to these attitudes, and how science itself is now leading us beyond the mechanistic world view to a new view of nature as a developing, evolving organism, which according to my own ideas has memory and habit within it. So this book is very relevant to the environmental and ecological problems we now face.

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